





## Delors warns of dangers in subsidiarity

By Andrew Hill in Strasbourg

MR Jacques Delors, president of the European Commission, yesterday warned of the risk of "institutional paralysis" in the European Community if member states pushed the principle of subsidiarity too far.

Tomorrow's emergency summit of EC leaders in Birmingham will consider the practical application of subsidiarity – the principle that the EC should take decisions only where national or local measures would not be more appropriate.

But it now seems certain that any meaningful statement on the institutional balance of power in the EC will be postponed.

Mr. Tristan Garret-Jones, the British Foreign Office minister, told a special session of the European Parliament yesterday that EC leaders would probably ask for further work to be done on the subject. "Guidelines and criteria" for the application of subsidiarity would be agreed at December's Edinburgh summit, he said in his address on behalf of the British presidency of the EC.

Outlining the Commission's expectations for Birmingham, Mr Delors said he hoped leaders would demonstrate their commitment to ratify the Maastricht treaty without renegotiation, their willingness to adopt the "Delors II" EC budget proposals for 1993-97, and their desire to open the Community to other countries.

"If the 12 leave Birmingham with restored confidence, with renewed enthusiasm for the common European family, that will help change the atmosphere and improve the situation in Europe," he told MEPs.

But Mr Delors refused to yield ground to those states – notably Britain itself – which want to retain in the Commission's powers.

He said that Brussels was against giving members a veto over legislation they believed infringed the subsidiarity principle. A single vote on the substance of the legislation was essential to avoid paralysis, he added.

Mr Delors also supported Strasbourg's call for increased transparency and democracy in the EC.

He again criticised the Council of Ministers, which takes the final decisions on EC legislation. "The Council sometimes seems like a closed shop where national egos clash."

The parliament last night backed a motion calling for the council to legislate in public, and for an "assizes" of the European and national parliaments to discuss the future of European integration.

## Franc intact after crisis, says central bank chief

By David Buchanan in Paris

THE franc has emerged "intact and reinforced" from last month's monetary crisis, Mr Jacques De Larosière, the French central bank governor, said yesterday.

Almost half the FFf160bn (\$33.47bn) spent in supporting the franc's parity against the D-Mark was flowing back, as speculators gambling on the franc's devaluation had to buy

it back at an unchanged rate, he said.

The governor gave no details of last month's intervention, but it is believed that half came from French reserves and the remainder was lent by the Bundesbank. The fundamental strength of the French currency allowed the German monetary authorities to declare the strength of parity between the franc and the D-Mark, said Mr De Larosière.

## Pöhl criticises the priorities of EC treaty

By Our Economics Staff

EUROPEAN Community governments have been too optimistic in aiming for economic and monetary union by 1999 along the lines set out in the Maastricht treaty, Mr Karl Otto Pöhl, former president of the Bundesbank, said last night.

Speaking at a reception at the Financial Times, Mr Pöhl urged the EC to forge ahead soon with the creation of a

European central bank, but to abandon such aspects as political union in the treaty for greater European integration. These arrangements would make sense for a "core group" of European nations.

"I have come to the conclusion that if you want a European currency and a European central bank you should not link that to too many other issues as was laid out in the Maastricht treaty. I think that was a big mistake," he said.

Instead, the tasks of a future European central bank should be limited to setting interest rates and determining liquidity. The institution should aim "like the old gold standard" at the depoliticisation of money.

Mr Pöhl – whose speech marked the launch of a book, The Bundesbank: the bank that rules Europe, by David Marsh, European Editor of the Financial Times – recalled that he had experienced antagonism from Bonn when raising

interest rates. But the Bundesbank's robust independence had conferred benefits on Europe and Germany. "The D-Mark has played a substantial role stabilising the European Monetary System. It has led to lower inflation in Europe, not only in Germany, and a narrowing of interest rate differentials until recently."

While a system of floating exchange rates would not be in Europe's interests, he critic-

ised the EMS as being "half-baked". Such fixed exchange rate systems would always prompt attacks on participating currencies. Also these systems would always be governed by the strongest currency, in this case the D-Mark. This could be "a problem by itself", he said.

It was "interesting and amazing" that in spite of the turmoil of German unification the D-Mark had remained the strongest currency in the

exchange rate mechanism. German unification, although now posing problems for Europe because of high interest rates, had earlier created "a demand-push" which had led to more opportunities for exporters in other countries.

Mr Pöhl said it would be logical for the "core members", generally thought to be Germany, France, the Benelux countries and possibly Denmark, to proceed soon with their own monetary union.

## Conflicting signals from the Danes

Denmark's Maastricht sceptics seem to have hardened their line, writes David Marsh

EUROPEAN governments trying to analyse Denmark's efforts to overcome its Maastricht predicament will need to show formidable mental agility. A set of reflecting mirrors might come in handy too.

In coming weeks, the Danish government will be sending two sets of messages – one for external consumption, and one for an internal audience – to try to resolve the imbroglio left by the Danish No to Maastricht in June.

Denmark faces two fundamental dilemmas.

First, to make the treaty palatable to a sceptical Danish electorate, the minority conservative-liberal government of Mr Poul Schlüter, the prime minister, has to propose important changes.

Above all, it wants to block any obligatory Danish participation either in Economic and Monetary Union (Emu) or in a common European defence.

Some of these changes would be difficult to swallow for other European governments which want to keep the Maastricht treaty basically intact – above all, in order to avoid a painful renegotiation process next year.

Second, no-one can be precisely sure why a small majority of Danes voted against the treaty 4½ months ago. According to one theory, if the treaty's proponents had described Europe's future using the Danish word "sammenslutning" ("binding together") instead of the foreign-sounding "union", the people would have voted

Yes. Another thesis is that Danish voters misread the treaty's proposals on a "social chapter" as inferring that the country's generous social security entitlements would be cut.

Summing up the convoluted path Denmark must follow to come up with its Maastricht proposals, Mr Henning Dyrsmose, the finance minister, says: "It has to be a different solution for us."

"But, for the others [in the EC], it must not be a different solution."

Mr Dyrsmose is fully aware of the difficulties posed by the need to reach simultaneous agreement both internally and with its EC partners.

"The challenge for us is the double decision-making process. We have to link [the two processes] together at exactly the right point in time."

Denmark already built into the original treaty last December a clause making participation in Emu subject to a further referendum later in the 1990s.

The government now, however, seems likely to press for a much stronger form of monetary "opt out" clause, perhaps modelled on the exemption Britain obtained at the Maastricht summit.

In fields like Emu, a majority of parties in the Folketing (parliament) is now talking of changes to the treaty substantial enough to require some form of renegotiation.

Mr Poul Nyrup Rasmussen, leader of the opposition Social Democratic Party (SDP), says he is seeking changes affecting



Prime Minister Poul Schlüter who was in Paris yesterday

above all defence and monetary union, as well as in the treaty's applicability to policies on citizenship and immigration.

He also wants a stronger definition of the application of "subsidiarity" – making decisions at the lowest level of government.

"If the new basis [sought for the treaty] is only a gentleman's agreement, then it will not be credible."

"A new model for Denmark

will be crucial. All the parties in the Folketing need to find a consensus on an amended treaty before it can be resubmitted to the electorate, either next summer or, possibly, in the autumn."

The SDP leadership campaigned in favour of the treaty before the June referendum, but 60 per cent of party members voted against the document – making the next referendum a vital test of the party's credibility.

Emboldened by opposition elsewhere in the Community to the goal of European union, Denmark's Maastricht sceptics seem to have hardened their line since the summer.

One diplomat in Copenhagen says the Danes will want to build in a number of additional safeguards – through extra protocols and clauses – in order to "over-insure" against the risk that the treaty will again be rejected.

The left-wing Socialist People's Party (SPP), which campaigned against the treaty this summer, is clearly in electoral competition to pick up disenchanted SDP voters.

Mr Holger Nielsen, the SPP leader, could play a pivotal role in the new prospective referendum campaign. He says he would like to vote Yes next time round.

But, first, amendments will have to be decided which will imply some form of renegotiation elsewhere in the EC. Mr Nielsen declares: "It's important to tell others that we want co-operation – but we don't want a European federation."

## Bundesbank sees stable rates soon

By Christopher Parkes in Frankfurt

THE German Bundesbank yesterday said it expected exchange rates to settle down after recent turmoil which led to an effective 6 per cent revaluation of the D-Mark against other currencies in the European monetary system (EMS).

However, it suggested there may have to be more adjustments in the run-up to full monetary union (EMU), due by the end of the decade. Any remaining exchange rate uncertainties could come to light after next January when the Community formally establishes the single European market. In its October monthly report, the bank reiterated its insistence that EC members should use any opportunities to change parties within the exchange rate system up to the final transition to monetary union.

Meanwhile, the recent effective revaluation of the D-Mark had brought its value back into line with that achieved by the last formal realignment within the EMS in 1987. This made it easier to control inflationary tendencies in Germany, "so that the quite considerable reductions in German interest rates achieved so far are not endangered".

Meanwhile, inflation was still well above 3 per cent, and the side-effects of recent interventions in money markets had exacerbated the difficulties of controlling money supply growth.



Isabelle Garavito, ballerina, photographed in a rehearsal room at the Paris Opera Garnier.

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## NEWS: WORLD TRADE

# US/EC farm talks choke on oilseeds

By David Dodwell,  
World Trade Editor

TWO days of intensive negotiations in Brussels have failed to resolve the European Community's dispute with the US over the EC oilseed subsidy regime - the biggest obstacle to settlement of the Uruguay Round of talks on world trade liberalisation.

"We are still worried about oilseeds, not just because it is the biggest problem, but because there is so little time to settle it," one trade official said. The EC is unwilling to cut oilseed output below 9.5m tonnes, while US farm lobbies want a 7m tonne ceiling.

Nevertheless officials said the Brussels talks had narrowed the gap between the US and the EC on a farm trade dispute that has prevented agreement on wider trade reform for almost two years.

Of three disputed issues, two appear to have been resolved in principle - that on a six-year programme of cuts in the volume of the EC's subsidised farm exports, and on EC

demands for compensation payments to European farmers for production cuts to be exempt from wider commitments to cut subsidies for domestic production.

The oilseeds dispute, which threatens to erupt into full-fledged trade war, remains unresolved. Mr Ray MacSharry, the EC Farm Commissioner, and Mr Ed Madigan, his US counterpart, are to meet within a week in a last-ditch effort to reach agreement.

Mrs Carla Hills, the US trade representative who led the US negotiating team, abandoned plans to visit Paris - where opposition to EC concessions has been fiercest - and returned to Washington yesterday. She plans to continue talks with Mr Frans Andriessen, her EC counterpart, on the margins of a meeting in Canada at the weekend between trade ministers from Canada, the US, the EC and Japan.

In Germany, members of the Bundestag yesterday condemned French efforts to block a Uruguay Round agreement as "intolerable".

# Japanese airline to buy Boeing jets

By Robert Thomson in Tokyo

AIR Nippon, a subsidiary of the Japanese airline All Nippon Airways (ANA), said yesterday it would buy 15 B737-300 Boeing aircraft in a deal worth an estimated ¥80bn (\$573m).

The airline, which operates regional routes within Japan, said a selection committee, after "exhaustive evaluations", had chosen the model ahead of the Airbus A319, the British Aerospace 146, the Fokker F100 and the McDonnell Douglas MD87.

Government officials insist that aircraft purchases are made on the grounds of quality, and not politics, but the

European Community has complained that some purchases appear to be designed to appease Washington or the politically influential US aircraft industry.

The EC has become more concerned as Japan's trade surplus with the US has risen, apparently putting more pressure on the country's airlines to increase purchases of US equipment.

Air Nippon said the choice of the B737-300 "reflected such factors as the safety, reliability, operability, comfort and economy of the aircraft, and the production systems of the manufacturers".

# Satellite telephone venture launched

THE race to provide global portable communications by satellite is heating up with the announcement that Nokia Mobile Phones, the world's second largest mobile phones manufacturer, and Inmarsat, the London-based international satellite communications co-operative, are working together to develop a satellite based mobile telephone system, writes Michio Nakamoto in Tokyo.

Inmarsat believes the market for handheld satellite phones will grow to up to 2m users in seven years.

Nokia's role in the joint project would be to provide handsets while Inmarsat, which already provides global communications through its 11 geo-stationary satellites, would provide the network.

# Microsoft to open in eastern Europe

Microsoft, the world's largest computer software company, is to set up subsidiaries in Hungary, Russia, Czechoslovakia and Poland, becoming the first software company to establish a broad presence in eastern Europe, writes Louise Kehoe in San Francisco.

Microsoft said its decision to expand there follows solid growth over the last 18 months of sales through distribution networks in these countries. Microsoft also plans to introduce 16 products for the new European markets by the second quarter of 1993, including its popular "Windows" operating system.

# Trinidad boost for gas vehicles

The Trinidad government has awarded a \$15m contract to Norwalk of the US to set up natural gas fuelling stations, writes Our Foreign Staff.

The stations are part of Trinidad's drive to keep more of its locally-produced liquid petroleum for export by encouraging the domestic use of natural gas vehicles.

# Bush deftly breaches China trade wall

Republicans trumpet deal with Beijing as victory for the president's policies, writes Nancy Dunne

FOR President George Bush it was one of the brighter moments in the televised candidates' debate on Sunday night: with his domestic economic policies under attack, the president was at least able to claim a new success for his China trade policy.

"I am the one that said let's keep the MFN [most-favoured-nation trading status] because you see China moving towards a free market economy. But Governor [Bill] Clinton's philosophy is isolate them. He says don't do it, but the policies he's expounding of putting conditions on MFN and kind of humiliating them is not the way you make the kind of progress we are getting."

On October 10, the day before the debate, Beijing capitulated to wide-ranging US demands for reforms which would allow greater access to their market for foreign goods. Under threat of nearly \$4bn in retaliatory sanctions by the US on its exports, China agreed to:

- Publication of all laws, regulations, policies and guidance on the operation of its import/export system.

- Removal of most quotas, import restrictions, import licensing requirements and import controls according to a strict timetable.

- "Significant" tariff reduction on a wide range of products including foods, chemicals, iron and steel products,

photographic materials, machinery, cosmetics, confectionery and electrical parts.

- Publication of all previously inaccessible commercial information on sales and marketing opportunities.

- A ban on import substitution measures, the requirement of technology transfer or local investment as conditions for investment.

- Establishment of an expert working group to discuss health and sanitary standards for farm products. Agreement

Clinton says Bush got tough with China only because he was pressured to do so by Congress

to eliminate within one year any scientifically unjustifiable restrictions that serve as trade barriers.

This was the third US trade triumph over China this year. In January, under pressure of a deadline and threats of sanctions totalling \$750m, Beijing agreed to take action to protect foreign patents, copyrights, trademarks and trade secrets.

In June, the US and China signed a memorandum of understanding allowing US embassy officials to visit Chinese prisons if they suspected they were producing goods for exports to the US.

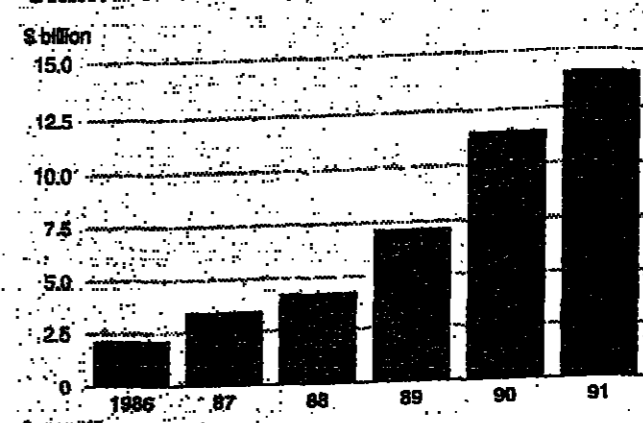
The new agreement commits China to phase out import barriers in many key sectors beginning on December 31 1992, and continuing until December 31 1997. These openings are expected to increase imports of vehicles and parts, computers, telecommunications, electrical appliances, foods and grains, medical equipment, chemicals, pharmaceuticals, photo equipment, photocopyers, beer, wine, alcoholic beverages, mineral waters, wood products, steel and a wide range of machinery.

Governor Clinton, the Democratic presidential candidate, said China's promise to lower its trade barriers was the right thing to do in view of its \$15bn trade surplus with the US. Furthermore, he said, the Bush administration had got tough with China only because it was pressured to do so by Democrats in Congress.

While there is truth in this charge, the administration's resolve was also stiffened by the soaring trade deficit with China.

Mrs Carla Hills, the US trade representative, can be credited with deftly executing the policy with an eye to Chinese sensitivities. President Bush's promise to Democrats in 1991 to "work actively" for Taiwan's admission to the General Agreement on Tariffs and

China: trade surplus with US



Trade was never fulfilled. Instead, the US has passed to the EC the negotiating lead on Taiwan's admission to GATT, while Mrs Hills held out the promise of US support for China's GATT membership in exchange for co-operation on trade reforms.

In an official statement accompanying the agreement on Saturday, she was a graceful winner. "In bringing its practices into line with international practice, China will help achieve its own goal of becoming a full member of the international trading system. It is a win-win situation."

The market access pact, while widely praised by the US business community, will not entirely dispel the view promoted by Governor Clinton that the president "coddles" the Chinese leadership.

He has promised support for legislation passed this year by the Democratic majority Congress but vetoed by President

Bush. It would make China's MFN status (which gives it the lowest tariffs on offer to any US trading partner) conditional on an annual presidential determination that China was improving its human rights performance. To encourage a continuation of China's private sector reforms, MFN status would be lost only for goods produced in the state sector.

The Bush administration argues that the plan is unworkable because the goods could come from anywhere. Democrats say origin can be determined and point to the Customs Services' tracking of Chinese goods transhipped through third countries and goods produced by prison labour.

"If we can stand up for our economics, we ought to be able to preserve the democratic interests of the people in China," he said in the debate, "and over the long run they will be more reliable partners."

# Czechs look west for motorway builders

By Andrew Taylor,  
Construction Correspondent

GERMAN, French and Italian companies have been short-listed to bid for one of the first privately financed motorways in eastern Europe.

Three consortiums have been chosen by the Czech Republic to bid for an 83km stretch of motorway from Hradecov on the Czech-German border to Pilsen, roughly halfway between the border and Prague. It is part of a planned motorway linking the Czech

capital and Nuremberg.

The road is expected to cost about £280m, including finance charges, according to Kleinwort Benson, the British merchant bank which has been advising the Czech authorities.

The republic plans to offer concessions for a further 400km of private toll motorway if the initial project succeeds.

The three consortiums make up a mixture of large construction companies and private toll road operators, notably from France and Italy. The groups comprise:

- Strabag International of Germany; Stavby of the Czech Republic and GTM International, Dumez International and Cofroute of France.

- Philipp Holzmann of Germany; Cogefarimprist of Italy and Nord Franc, Tranroute International, and Beugnot of France.

- Italstrade, Autostrade, Salini Construttori and Chirola of Italy and Hochtief of Germany.

The Czech Motorway Directorate said the three consortiums had "demonstrated their capabilities in motorway development and operation and their commitment to finance the project."

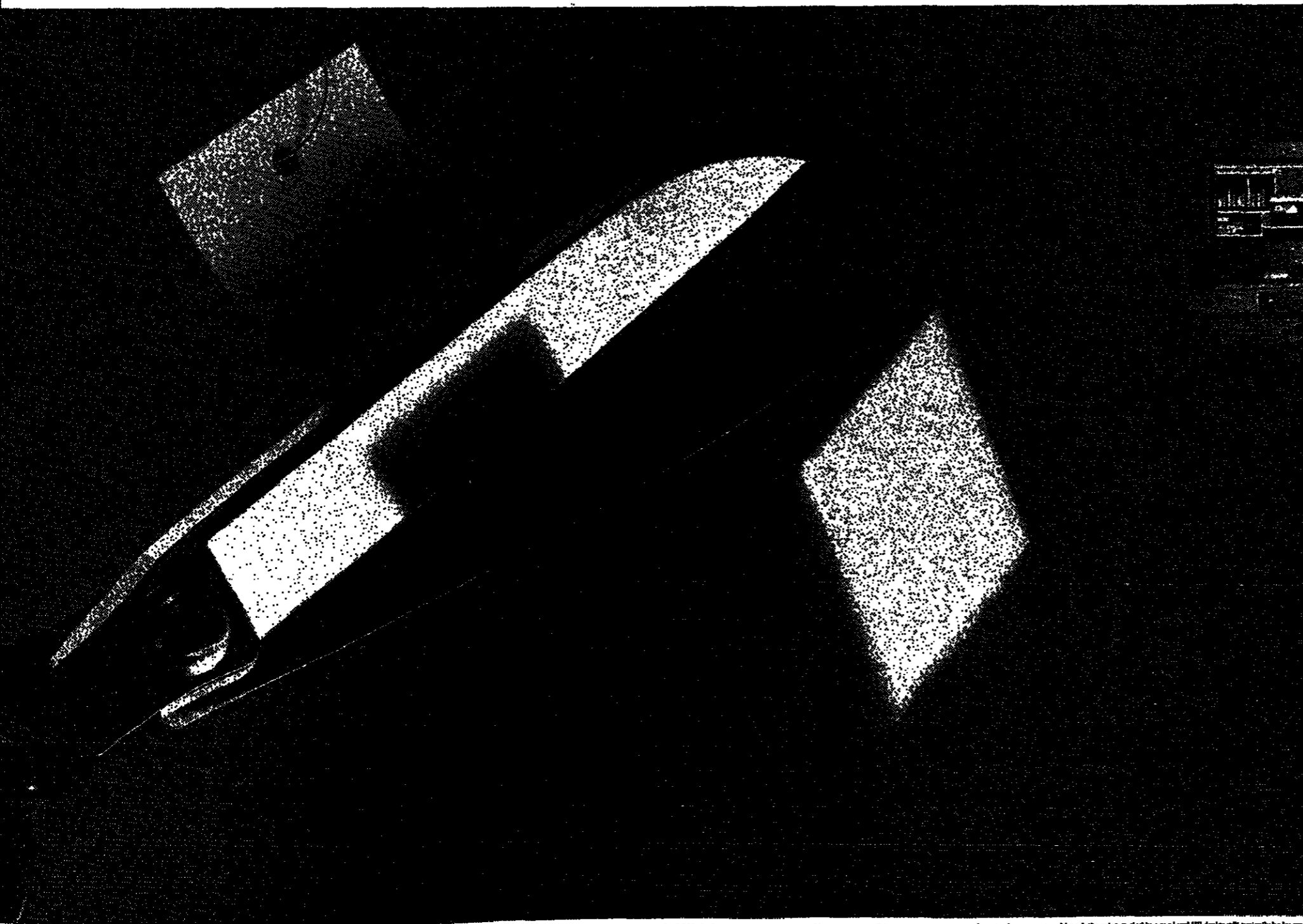
Tender documents will be issued later this month requiring the groups to submit their final proposals around March next year. Construction is planned to start in the final quarter of 1993.

The Czech Republic is only the second former eastern bloc country to seek tenders for a privately-financed toll road. The first was Hungary which last year announced plans for a toll motorway from Budapest, the Hungarian capital, to the Austrian and Czechoslovak borders.

Like other former communist countries, Hungary and the Czech Republic face heavy demands on their road systems because of rising levels of car ownership and growing east-west trade.

They have turned to private operators because they lack funds to build motorways themselves. Hungary last year announced a Forints 320bn (\$2.3bn) road construction programme, about half of which is planned as new motorways - many of which may have to be financed privately.

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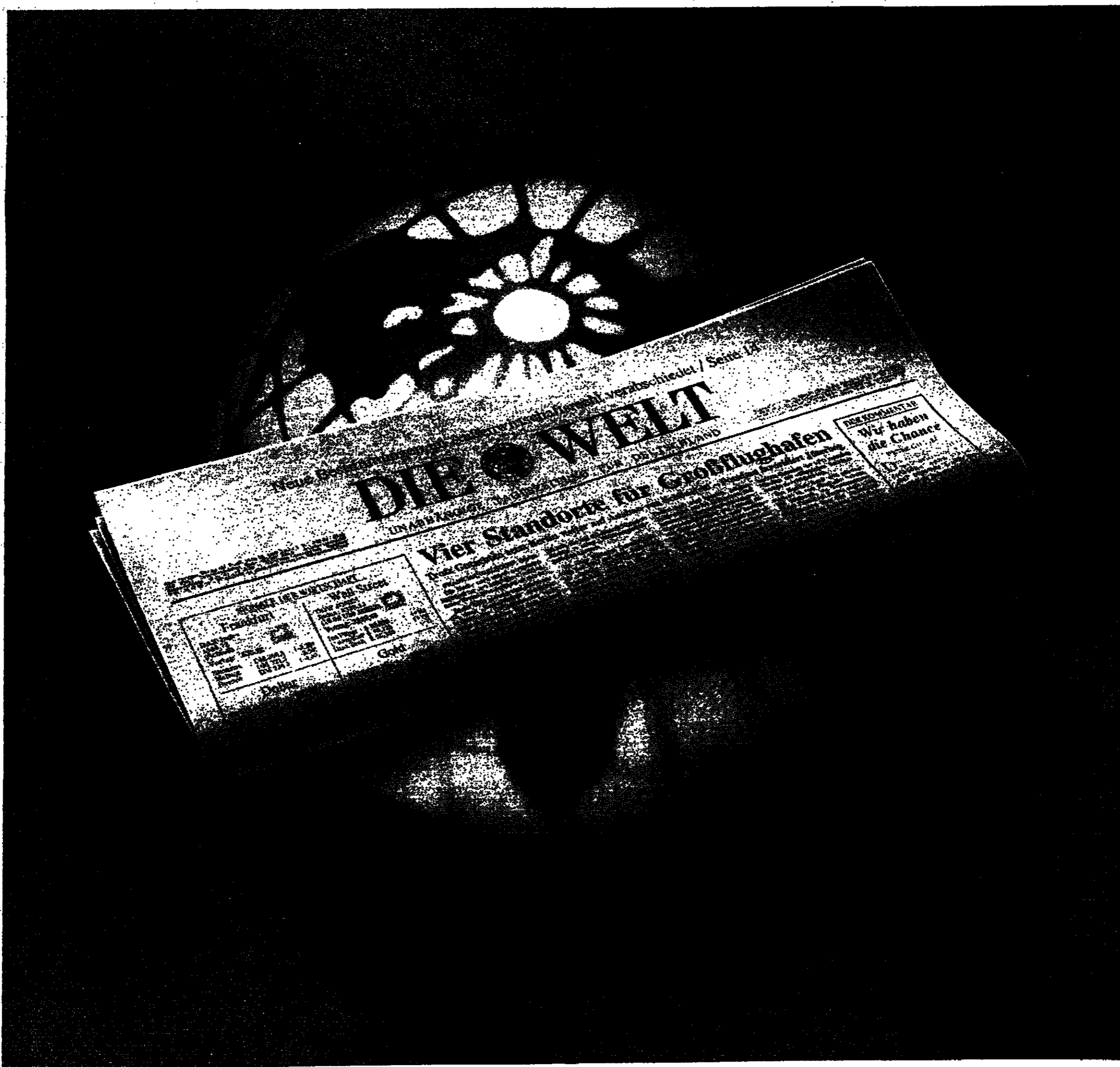


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**Nichts ist  
so alt wie die Zeitung  
von gestern.**

## NEWS: UK MINE CLOSURES



Fighting talk: Arthur Scargill, leader of the National Union of Mineworkers, announcing moves yesterday to ballot miners on strike action in protest at what he called British Coal's "savage" closure plans. Mr Scargill (above) said: "This round of closures smacks of vindictiveness - there is no economic basis for these closures"

## 'Dash for gas' described as economic madness by British Coal chief

### Generators defend fuel switch

### Pit closures threaten railway jobs

By David Lascelles,  
Resources Editor

ELECTRICITY companies responded sharply to allegations yesterday that they had contributed to the sweeping closures at British Coal (BC) by switching from coal to gas.

The "dash for gas" as it has been dubbed, was described as "economic madness" by Mr Neil Clarke, BC's chairman. He said it was driving coal out of the generation market, and could push electricity prices up in the long run.

East Midlands Electricity, which is building a gas plant at Corby, central England, said: "We wouldn't enter into developments unless they represent value for our customers and put downward pressure on prices."

The dash for gas was typified only two weeks ago when Mr Ed Wallis, the chief executive of PowerGen, one of the UK's two large power generators, opened a brand new 900MW gas-fired station at Killingholme on Humberside. On the same day, he and his colleagues at National Power, the other large generator, announced that they were closing 2,700MW of surplus power plant, most of it coal-fired.

On the face of it, the position does look absurd. The UK is shutting down long-established power stations using a resource which is plentiful and could last for hundreds of years. In their place it is investing billions of pounds in stations using a fuel which

could run out in as little as 50 years. Currently, 16 gas-fired power stations are either running or under construction with a total capacity of 11,000MW, equivalent to about a fifth of requirements in England and Wales. These will displace about 30m of coal a year. More than 30 other projects have been mooted which, if completed, would bring total gas capacity to over 20,000MW.

transport than coal, and leaves no scars on the landscape.

The fourth is economics, though the picture is murky.

The companies investing in the new power stations claim that they make good commercial sense. Mr Malcolm Faulkner, marketing director at Norweb which is involved in two gas projects, said that they enabled Norweb to spread its risks across a wider range of

the construction of gas-fired power stations defies commercial logic.

The economics of gas-fired stations are complicated by the fact that British Gas, which is supplying many of them, raised its prices for long-term contracts by 25 per cent last year as the full scale of the dash for gas became clear. This means companies which signed up early have a much better deal than the late-comers.

Under the present price regime, electricity distribution companies are allowed to pass on the costs of power generation to customers. Large power consumers claim this gives them no incentive to go for cheaper fuels. The CCC and the coal unions plan to take the electricity regulator, Prof Stephen Littlechild, to court for allegedly failing to enforce a condition in the electricity licences which obliges distributors to purchase electricity at the most economic prices.

Prof Littlechild says he will not look at the gas contracts in isolation, but as part of the electricity companies' overall portfolio of supplies. But he is conducting a review in which, he says, he will be "looking for a control which provides sharper incentive to economic purchasing".

All the electricity companies are playing their cards close to their chest. Sensitive commercial information is involved. But with the political and judicial stakes also high, this is an area where it suits a lot of people to keep quiet.

#### COMPARATIVE POWER GENERATION COSTS (pence per kWh)

Coal under current contracts at £1.85 a gigajoule	2.4
Coal under new contracts at £1.50 a gigajoule	1.9
Gas	2.4 to 3.2
Nuclear	4.0 to 6.5

Source: McCloskey Coal Information

Many factors are driving this shift. One was the lifting early last year of an EC ban on the use of gas for power generation. That opened up the North Sea's vast gas reserves to a whole new market.

A second was the privatisation of the electricity industry two years ago which gave the regional distribution companies greater freedom to choose where to buy their power. Many of them wanted to escape the duopoly of PowerGen and National Power and build their own power stations.

A third was the environment. At a time when the UK is committed to reducing emissions of carbon dioxide and sulphur, natural gas provides a relatively clean source of power. It is much easier to

fuels and technologies, and obtain longer term supplies than were available from coal.

The new combined cycle gas turbines (CCGT) which re-use hot exhaust are also cheap to build, and produce energy more efficiently. When opening Killingholme, large enough to supply all of Birmingham's electricity, Mr Wallis said that CCGT electricity cost between 2.2p and 3.1p a kWh compared to 3.26p for coal.

Others are less sure. The Coalfields Communities Campaign, which is fighting the pit closures, calculates that many gas plants will produce more expensive electricity than the coal-fired stations they are driving out of business. An analysis it published last week concludes: "On the face of it,

Richard Donkin meets the families set to lose their livelihood as the pit closures begin

## Miners see grim future at end of the tunnel

COLIN Black expects to leave more than memories behind him in three weeks time when production stops at Bilsthorpe colliery in Nottinghamshire, central England.

At 21, he is one of the colliery's youngest recruits. But his whole life has been shaped by the coal industry.

"My grandad was killed down Bilsthorpe pit 22 years ago. Another grandad died of emphysema after working in the pit," he said. His father, uncle and cousin all worked at the mine.

"I thought I had a long future here when I started just over two years ago. They told me the colliery would have a life of 50 years," he said. He and his wife Jane are expecting their first child in February.

Mrs Black has worked out that with her wage at a hosiery factory and unemployment benefit they should have an income of nearly £100 a week when Mr Black stops work. "He was earning £500 a week at the pit so we are going to see a big drop in standards. And where round here is he going to find work?"

Many of the younger miners were encouraged into the pits by their fathers. Mr Harold Sheppard, 52, is one of the oldest among the 568 miners at Cotgrave pit near Nottingham who will work their last shift on Friday.

"I'll be all right," he said.



"We thought we were set up here, but look at us now." Miners at Bilsthorpe Welfare Club contemplate imminent redundancy

"It's the young ones I feel for. The average age at our pit is 32. I brought my son in there. What is he going to do?"

Cotgrave pit had geological problems and the miners knew its days were numbered but previously the closure programme has allowed transfers to other mines; not this time.

The re-location programmes have led to a broad mix of regional backgrounds across the coalfields. In Nottinghamshire men from Durham, Scotland and Wales work beside second generation Latvians and Estonians.

Mr Jim Campbell came to

Clipstone with his father Hamish from Ayrshire in 1978. He and his brother followed their father into the pit. "We thought we were set up here, but look at us now. It's finished for everybody."

Reclamations have begun to emerge among the miners' welfare clubs across the Nottinghamshire coalfield as the full implications of the cutbacks become apparent.

Divided loyalties between members of the National Union of Mineworkers and the breakaway Union of Democratic Mineworkers have resurfaced, though not with the bitter-

ness of the 1984 strike. At Bilsthorpe Miners' Welfare, former pickets drink side by side with those they picketed eight years ago. The NUM men are determined to salvage some pride from their defeat in the year-long dispute.

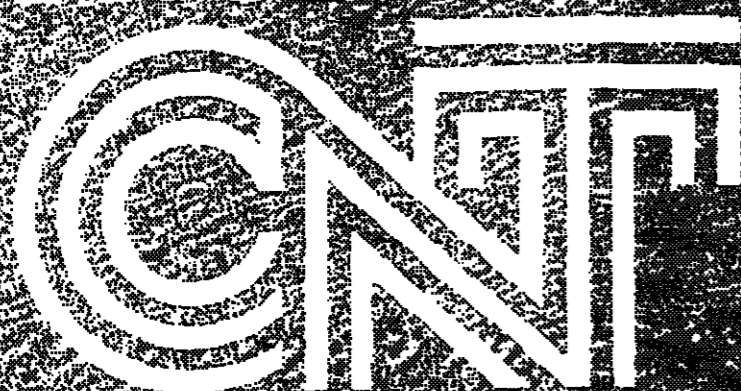
Brandishing a tattoo on his forearm that commemorated previous strikes, Mr Ronnie Green, a former miner, said: "A lot of people here sold their souls, but by God they wish they hadn't now. I saw it coming. These lads have been sold down the river more than I have been."

Mr Alan Stoneman, another NUM man who joined the 1984 strike, compared the government's coal policy to that of its support for nuclear power which has included subsidies levied from other energy producers.

Mining colleagues at the club studied their beer glasses when he claimed the NUM had been right about the threat to the coalfields eight years ago.

"The time has come for you to admit it," he said to them. Mr David Smith, a UDM man, looked him in the eyes, and said: "You were right and I was wrong."

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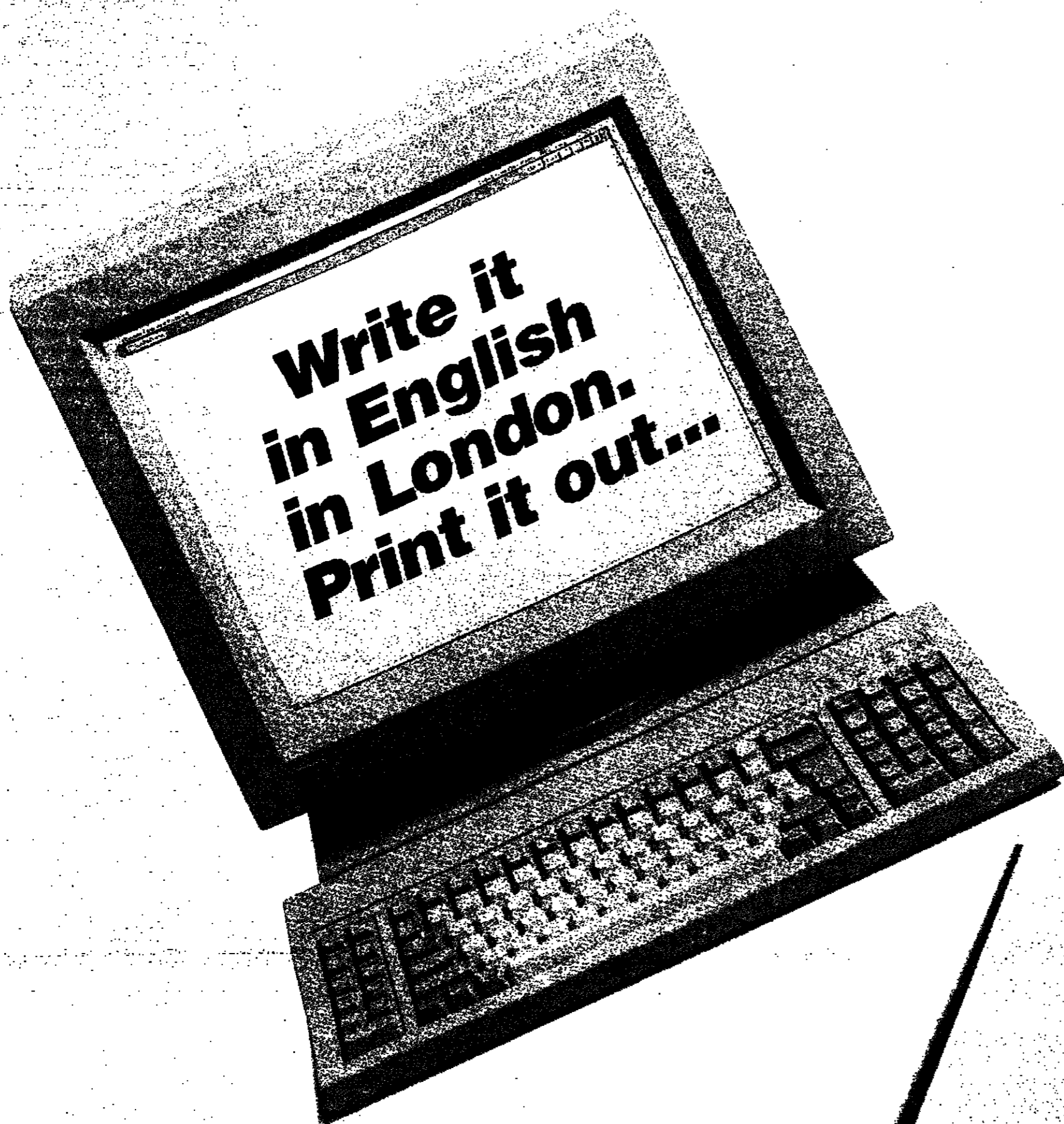
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Thursday October 15 1992

prospects. Japan is on course to boost its proportion of nuclear electricity from about 25 per cent now to 35 per cent within 10 years. An important problem in densely populated Japan is where to put reactors; however, a large site at Higashidori in the far north of the main island, Honshu, has just become available, following an agreement on compensation between the utilities and local fishing co-operatives.

Elsewhere in the region, South Korea and Taiwan are leading the nuclear expansion movement.

■ In the United States, the industry's pressure group, the Council for Energy Awareness, was able to proclaim 1991 as "a banner year" even though there was still no sign of any new orders, because the country's 111 plants put on a record performance, operating at 70 per cent of capacity compared to 66 per cent in 1990.

world's nuclear power. Their total nuclear generating capacity is expected to rise from 264 gigawatts (GW) in 1991 to 296 GW in 2000 and 321 GW in 2010, but the industry will lose ground slowly in relation to other sources of power.

The latest projection for the end of the century is only one quarter of the one published in 1977, when the NEA forecast that OECD countries would have 1,200 GW of nuclear capacity in 2000.

The two crucial events undermining the growth of nuclear power were the Three Mile Island accident in 1979 – since when no new plant has been ordered in the US – and the Chernobyl disaster in 1986. They were the focal points for a more general loss of public confidence in nuclear safety. Anti-nuclear groups have played successfully upon people's fears both of a sudden Chernobyl-type release of radiation and of the slow impact of radioactive wastes on the environment.

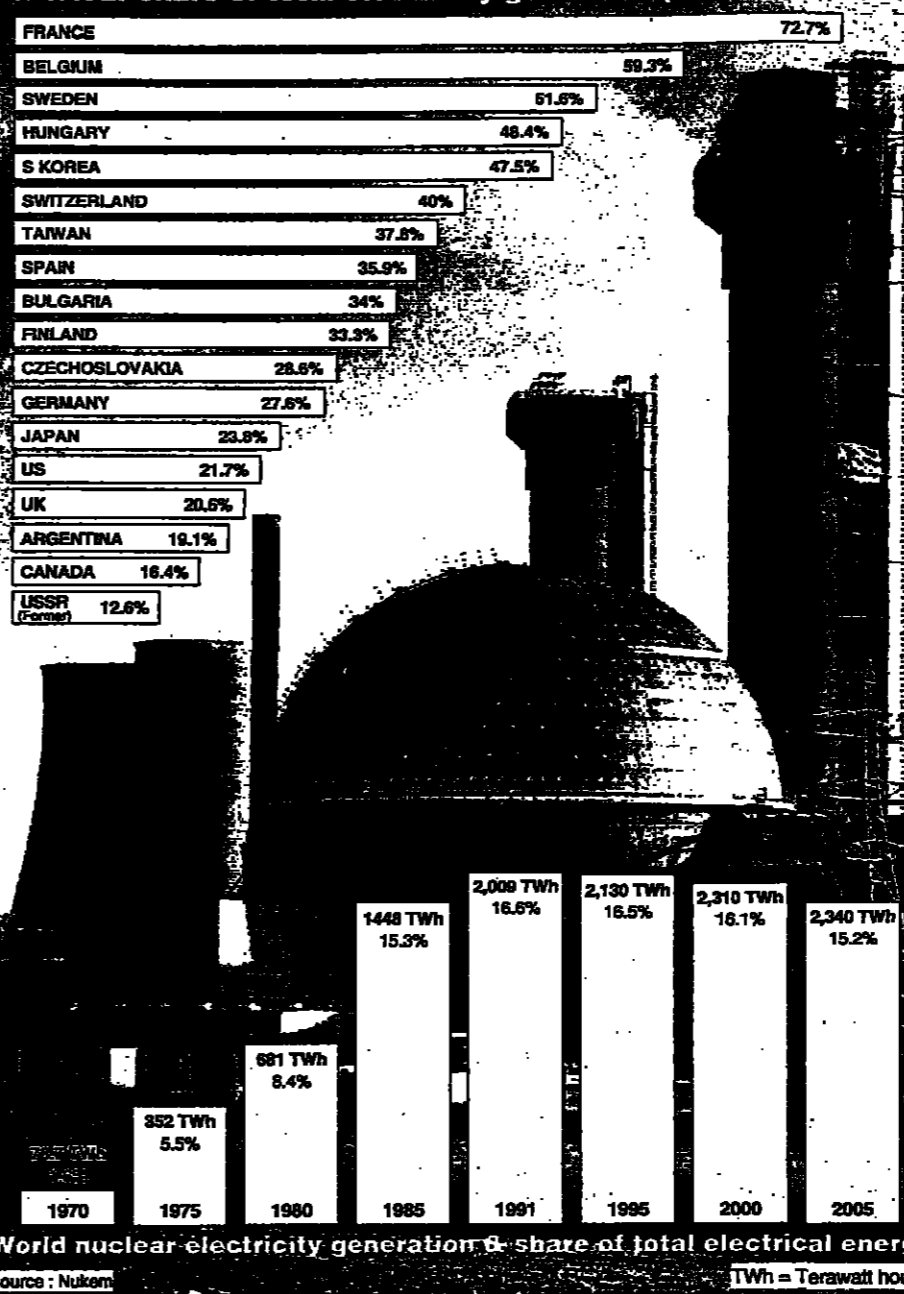
At the same time, nuclear power has been struggling against the perception that it is uncompetitively expensive. Its costs are only partly caused by increasingly stringent safety requirements. Another factor is that the

The industry now hopes that US utilities will start to order "new advanced design nuclear plants" in the mid-1990s. Three US manufacturers (Westinghouse, General Electric and ABB/Combustion Engineering) are working on reactor designs.

■ In western Europe, France is the showpiece of the nuclear industry. PWRs generate almost three-quarters of French electricity – more than anywhere else in the world – and export surplus power to neighbouring countries. Although a few more PWRs are now under construction or being planned by Electricité de France, the country does not want to rely on nuclear for more than 80 per cent of its electricity, for reasons of diversity and security of supply. In the UK, 1994 will be

a crucial year for the industry: the country's first PWR, Sizewell B, is due for completion and the government has promised to review the whole future of nuclear power then.

■ In eastern Europe, the nuclear industry has been disrupted, like all other activities, by the collapse of communism and the Soviet



But the most compelling strategic argument for maintaining nuclear power is that it ensures a diversity of energy sources for individual countries and for the world as a whole.

Nuclear power cannot provide a viable option for the future if the supporting industry is allowed to wither away. Lead times are so long - a decade for an individual nuclear plant and much more than that for a new generation of reactors - that an active programme of manufacturing, development and research is essential.

The most forward-looking research is into fusion power: obtaining energy from combining light atoms rather than splitting heavy ones. The Joint European Torus (JET) at Culham near Oxford achieved a sustained fusion power for the first time last November, and the EC, US, Japan and Russia agreed this year to spend \$1 billion over the next six years designing a 1,000 MW International Thermonuclear Experimental Reactor. If ITER succeeds, it will then have to be followed by a demonstration power plant. Preferential treatment could become a commercial reality – some time in the middle of the next century.

Even critics of the nuclear industry have to admit that it has long-term vision.

Six years and £1,850 million after work first began on THORP (the Thermal Oxide Reprocessing Plant), British

much as 1,000 years by recycling recovered uranium and plutonium for re-use in civil reactors.

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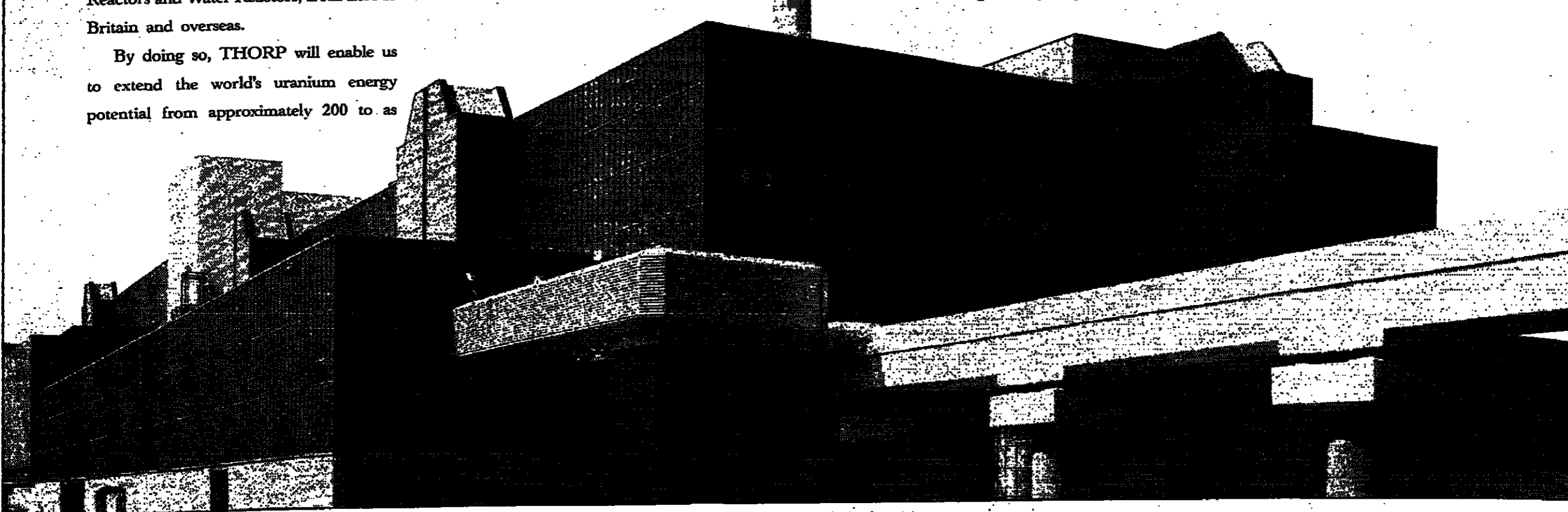
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## THE NUCLEAR INDUSTRY 3

Andrew Baxter on the Siemens-Framatome venture

## Partners put safety first

THE big vendors of nuclear power equipment will tell anyone prepared to listen that they remain confident about the long-term future of nuclear energy as an important source of electricity generation.

Despite the present difficult market conditions - virtually worldwide, suppliers are still spending heavily to stay in the race, and thus prove - eventually - that their beliefs are not merely empty rhetoric.

But designing a new generation of nuclear power plant has always been a long-term affair, and with so few business opportunities, it is becoming increasingly necessary for suppliers to plan ahead in co-operation with each other.

That was the background to Siemens of Germany and Framatome of France collaborating in 1989 in the field of pressurised water reactors (PWRs) through the creation of their joint subsidiary Nuclear Power International (NPI).

Three years later, the project is nearing the end of an important first phase that has already illustrated the immense challenges of designing a new generation of PWRs, but has also shown the benefits of European co-operation in a market where a handful of players are determined to last out the present rough patch.

By linking two leading reactor suppliers in Europe, the venture would have been important for the industry even if it had remained limited to its original terms - the marketing of PWR units based on the existing technology of the two parent companies and the joint development of the next generation of PWR units for export.

But, says Dr Bruno Baumgartl, NPI's managing director, both Siemens and Framatome realised that the new PWR could not be designed without feedback from the German and French utilities which operated PWRs, or without co-operation from both licensing authorities.

Yet Electricité de France had already started a long-term programme, REP 2000/N4+, for a new generation of PWRs, while several German utilities had signed an agreement with Siemens in 1989 jointly to define a concept for future PWR units. This was known as the Planungsaufrag.

It was clear, therefore, that having three development programmes was a potentially huge waste of resources, and after a series of discussions in 1991 it was agreed to merge the available results from the two national programmes with the NPI development programme.

What has emerged, therefore, looks much more logical: a joint development programme

called EPR - European Pressurized Water Reactor - which in France will be the successor of the N4 series, in Germany will replace the Konvoi design, and elsewhere will be NPI's reference for export.

The design concept is an essentially evolutionary development from the reactors built by Framatome and Siemens in the past, and, says Dr Baumgartl, there is not much that can be done to improve on the performance of these plants in

## The project has shown the benefits of European co-operation

terms of output.

A nuclear power plant has to be competitive in comparison to possible fossil-fuelled plants, which is only possible with a capacity greater than 1,000MW. And with 1,400MW nuclear units now being operated with success in the European grid, there was no reason to return to a smaller size. So NPI is basing its concepts on a power output of 1,450MW, corresponding to the N4 units under construction in France.

The main focus of efforts is on safety, to help facilitate public acceptance of nuclear power and thus the commercial prospects for the EPR. NPI is working on a two-fold strategy, of which the first is to improve the preventive level of the traditional "defence in depth" approach as compared to existing products.

The target is to reduce the chance of a core melt - the worst thing that can happen to a nuclear power station - to less than one in 1m per year for internal events, while no "family of events" should be more than 10 per cent of this figure.

"This is the conventional way to make improvements," says Dr Baumgartl. "But it would not be sufficient to improve the acceptability of nuclear power in the public mind." The second part of the strategy, therefore, is to assume the worst case scenario and mitigate its effects so that radioactive releases can be limited to the plant or nearby.

This emphasis, naturally, focuses attention on the reactor building design and safety systems, as with any nuclear power plant. But it also points to the importance for NPI of co-operating with German and French licensing authorities to achieve common standards.

NPI is now presenting proposals to authorities in both countries to achieve a harmonisation of safety rules. Although it cannot be said that one country's rules are generally tougher than the other's,

there are different means to achieve the same goals, says Dr Baumgartl.

The harmonisation challenge is one reason for the project's extended timescale. The first phase of the project, determining a "joint technological concept", should be completed by the end of this year or the first quarter of next year. A second phase of work to establish a basic design phase will begin in April, and will be paid for by the utilities. Construction licence applications could then be made to authorities in both countries in 1995, with construction beginning in 1998.

Dr Baumgartl's hope is that, by then, sentiment towards nuclear power will have changed in NPI's favour. Although forecasting is difficult, he says some nuclear plants will have to be replaced in France, while the debate in Germany about the greenhouse effect could work in the nuclear industry's favour.

The two home markets will be important for NPI. "For a new product, or one developed from previous products, it is necessary to have domestic orders so that it can be sold abroad," says Dr Baumgartl - making the decision to merge the three PWR projects all the more sensible commercially.

THE world nuclear industry can look at the former Soviet Union and eastern Europe in two entirely different ways.

The region could be a source of much-needed orders to bring its 58 Soviet-designed reactors up to western standards of safety and efficiency - and perhaps even to build entirely new plants in countries that are particularly short of generating capacity. Upgrading nuclear plants throughout the region would cost \$10bn to \$20bn.

Or, if the worst happens and there is another nuclear accident as serious as the 1986 Chernobyl disaster, its impact on public opinion would be serious enough to destroy any prospect of a renaissance in the industry for another decade.

Most attention has focused on 26 reactors which western experts believe to be particularly hazardous: 15 Chernobyl-type RBMKs (water-cooled graphite-moderated reactors) in Russia, Ukraine and Lithuania; and 10 VVER-230s (old pressurised water reactors) in Russia, Bulgaria and Czechoslovakia.

The G7 summit meeting in Munich last July considered setting up a \$800m multilateral fund to carry out the most urgent safety work. But the seven leaders failed to agree on the proposal (largely because the US and Japan preferred to make their own bilateral arrangements for nuclear assistance). Instead they passed the problem to the 24 OECD coun-

Clive Cookson looks at safety in eastern Europe

## Chernobyl's shadow looms

tries, known for this purpose as Group of 24.

When officials and nuclear experts from the G24 met in Brussels last month to co-ordinate plans, they heard that firm commitments to safety assistance in eastern Europe and the former Soviet Union amounted to little more than \$300m, mostly from the EC. Provisional pledges of aid could take the total to around \$700m.

The only significant western-

## Upgrading plants throughout the region would cost \$10bn-\$20bn

funded safety work undertaken so far has been at Kozloduy in Bulgaria, which was described last year as the most dangerous nuclear plant in the world.

Inspectors from the International Atomic Energy Agency (IAEA) had discovered not only basic design defects - for example, the lack of an emergency cooling system and containment to enclose the reactors in an accident - but also a management and workforce too incompetent and demoralised to run the station safely. Even the basic operating manuals and plant drawings had

been lost - or perhaps removed by a departing Russian adviser.

Kozloduy is less dangerous today. Twenty nuclear specialists from western Europe have been working there for the past year, under the auspices of the World Association of Nuclear Operators (WANO), to improve the plant's management and operating procedures.

Virtually no assistance has yet reached the other nuclear plants of eastern Europe and the former Soviet Union, after two years of discussion and countless visits by assorted western organisations - nuclear utilities, consultancies, equipment manufacturers and regulatory bodies - all looking for commercial opportunities and often working at cross purposes.

Not surprisingly, the operators of Soviet-designed reactors are exasperated by the lack of real help after all the talk, as the heads of the Russian and Ukrainian nuclear utilities made plain on a joint visit to London last month. They said that, whether or not western assistance was forthcoming, they would continue to run their nuclear plants - and do what they could to make them safer from their own resources.

"If western governments will stop just talking and will give real assistance, then we will not reject that help, because it will enable us to solve the safety matters more quickly," said Mr Erik Pozdyshev, president of the Russian nuclear utility Rosatomenergoproekt. "But if the help is always delayed, we have the capacity to provide the necessary level of safety for our nuclear stations ourselves."

In the short run, the region

## Russian engineers are determined to carry on developing new reactors

is so short of electricity that all available plants will have to run close to full capacity during the coming winter. These include the two surviving reactors at Chernobyl itself, which the Ukrainian parliament has said must be closed permanently by the end of next year.

Rosatomenergoproekt plans to keep the 11 RBMK reactors in Russia running well into the next century, after upgrading their safety systems. The Sosnovy Bor plant near St Petersburg - where a radiation leak caused widespread alarm last March - will operate at least until

2003. At the same time Russia will open new PWR-type VVER reactors, starting with a 1,000MW unit at Balakovo which is virtually completed and due to start operating next year.

As a result of Chernobyl, public opinion is more hostile to nuclear power in the Ukraine and the country has a moratorium on commissioning new nuclear plants. But Mr Vladimir Fuks, chairman of the Ukrainian utility Ukratomenergoproekt, is keen to complete three new VVER reactors which are in the final stages of construction at Zaporozhe, Rovno and Khmelnyts. He forecast that parliament would vote next year to commission them if this winter is cold enough to bring severe energy shortages.

Meanwhile, Russian nuclear engineers - still proud of their achievements in spite of western criticism - are determined to carry on developing new reactors for the next century.

Work on fast (breeder) reactors continues, though at a much slower pace than before the break-up of the Soviet Union, and some believe that their salvation could be a collaboration on fast reactor development between Russia and Japan.

The R&D Institute for Power Engineering in Moscow favours a fast reactor cooled by molten lead (instead of the molten sodium favoured in the west) which its scientists say could be developed within 12 years.

**One day, all power stations will be made this way.**  
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At Sizewell in Suffolk, Britain's first Pressurised Water Reactor is presently under construction.

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## Ambitious schemes

Continued from previous page  
protest in recent years. It is now soliciting bids from western companies, one of which is Britain's Nuclear Electric, which would design the reactor as part of a consortium bid. Taiwan's capacity of 4,894 MW is supplied by six units, and 38 per cent of all electricity comes from nuclear power.

A new player is China, which recently synchronised its largely in-house 300 MW reactor outside Shanghai. The cornerstone of its programme is the 2 x 950 MW complex nearing completion in Guangdong Province.

The first unit of the GEC-Alsthon-Electricité de France project is to go on line next year with the second to follow a year later.

China is committed to adding five more units, at least two around Guangdong and others elsewhere in the country.

The potential for orders in south-east Asia has improved. Indonesia expects to put to tender orders for its first reactor later this decade, for start-up by 2005-2007, to be part of a large complex initially located in central Java.

Malaysia's Tenaga Nasional Berhad, the partly privatised state utility, may have its first nuclear station in 10 years, according to H. Samy Vellu, the energy minister, in a statement last month.

Thailand energy officials predict it will have its first nuclear plant, with a capacity

of 2,000 MW, operating by 2006 under the Electricity Generating Authority (EGAT). The plan is expected to prompt intense national debate.

The Philippines, which has had a moth-balled 820 MW reactor, supplied by Westinghouse, standing idle since 1986, is now finalising an agreement with the US company to commission the reactor by 1995-96. The reactor was suspended as a result of the post-Marcos anti-corruption clean-up by the Corason Aquino government.

India's outlook is grim. As a non-signatory to the Nuclear Non-Proliferation Treaty (NPT), its seven reactors have just 1,374 MW capacity. Western technology is not available to it, and the collapse of the Soviet Union means that a promised 2,000 MW complex in Tamil Nadu state is now cancelled. Its long-range programme to add 10,000 MW of capacity has been scaled back to 6,000 MW, and many believe that even this target is unachievable.

Pakistan, also a non-NPT nation, has an obsolescent 130 MW reactor in Karachi. China is preparing to build a 300 MW reactor, and talks are under way for a further 300 MW reactor.

However, the future of these plants is uncertain because of political objections and lack of capital.

The author is editor of Power in Asia, a Financial Times energy newsletter.

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## TECHNOLOGY

## Assault on food bacteria

The US Department of Agriculture has approved the use of a common food compound, trisodium phosphate, in poultry processing to reduce salmonella contamination.

Rhône-Poulenc, the French chemical group whose US subsidiary discovered the antibacterial activity of trisodium phosphate, calls it "a major breakthrough for public health". Following yesterday's USDA approval, the company is working urgently with the EC authorities to amend food hygiene regulations so that the process can be introduced in Europe, where more than 100 people suffer from salmonella-based stomach upsets every year - many caused by eating poultry.

The treatment, which Rhône-Poulenc calls AvGard, simply involves drenching each bird in trisodium phosphate solution at the end of the slaughtering process. Bill Swartz of Rhône-Poulenc says the total cost amounts to less than one cent per bird. Irradiation - an alternative method of killing bacteria - costs 5c to 20c per bird and is opposed by some consumer groups.

USDA tests showed that trisodium phosphate reduced the incidence of salmonella and other bacteria (including E Coli) more than 100-fold in treated birds. Rhône-Poulenc scientists do not yet know how it gets rid of bacteria so effectively, Swartz says, though "it may break the bond between the salmonella and the surface of the chicken".

Trisodium phosphate is used widely as a food ingredient, particularly for emulsifying processed cheese. The AvGard process leaves only "tiny traces" of the chemical on the bird; it has no effect on the taste, texture or colour of the treated chicken, according to tests by independent laboratories.

AvGard illustrates Rhône-Poulenc's approach to its food ingredients business, Swartz says. "It is going to be very difficult to get new ingredients approved so we need to develop new uses for existing ones."

Clive Cookson

On the wall of William Chatman's office at Foster Wheeler is a picture of an apparently unremarkable petrochemical plant built for a big UK client by the Reading-based process plant contractor.

The plant was completed on time and within budget. But it was not a happy experience for either the client or the contractor. "It was a good example of a project that succeeded even though the two teams were at daggers drawn," says the burly chairman and chief executive at US-owned Foster Wheeler.

Increasingly, the chemical industry is realising that the traditional, adversarial approach to getting plants built is just as likely to produce acrimony and lawsuits as results. It can be time-wasting, creates large amounts of tension and diverts attention from what the joint goals of the client and contractor should be, says Chatman.

A new type of relationship, involving "technology partnerships" or "preferred contractors", is now taking root in the process plant industry. One benefit, but by no means the only one or the main one, is to remove the "us-and-them" approach which can bedevil relations between client and contractor.

With a large, complex, chemical plant, technical problems can lead to protracted, and often pointless, arguments. "With the traditional relationship, you could have spent 10 days arguing about whose fault it was, now the problem can be solved in 10 days," says Sean Osborne, managing director of Portsmouth-based John Brown Engineers & Constructors.

John Brown and Foster Wheeler have been at the centre of the technology partnership trend - which,

**'With the traditional relationship, you could have spent 10 days arguing about whose fault it was, now the problem can be solved in 10 days'**

at least in the process plant industry, began in the US in the 1980s. In March the two companies signed a deal with ICI which makes them the preferred contractors for all jobs worth between £1m and £30m designed and engineered in the UK - wherever in the world the plant is to be built.

Partnering is a well-established idea outside the process plant industry - food retailers have been using preferred contractors for their supermarkets for many years to save time and money by eliminating the tendering stage and giving

Saving time, money and arguments is the aim of technology partnerships, writes Andrew Baxter

## Working in harmony

all or most of their work to one builder.

But process plant contracting is not only in a different league technologically, it also involves a huge range of technologies that very few contractors have the ability to handle in their entirety.

Often, big chemical companies such as ICI develop a process technology which is licensed to only a few contractors capable of handling it. Alternatively, the contractors develop their own proprietary techniques.

This makes it much harder for the chemical industry to give all its work to a small number of contractors - the ICI deal, for example, excludes larger contractors where a particular proprietary technology may be critical.

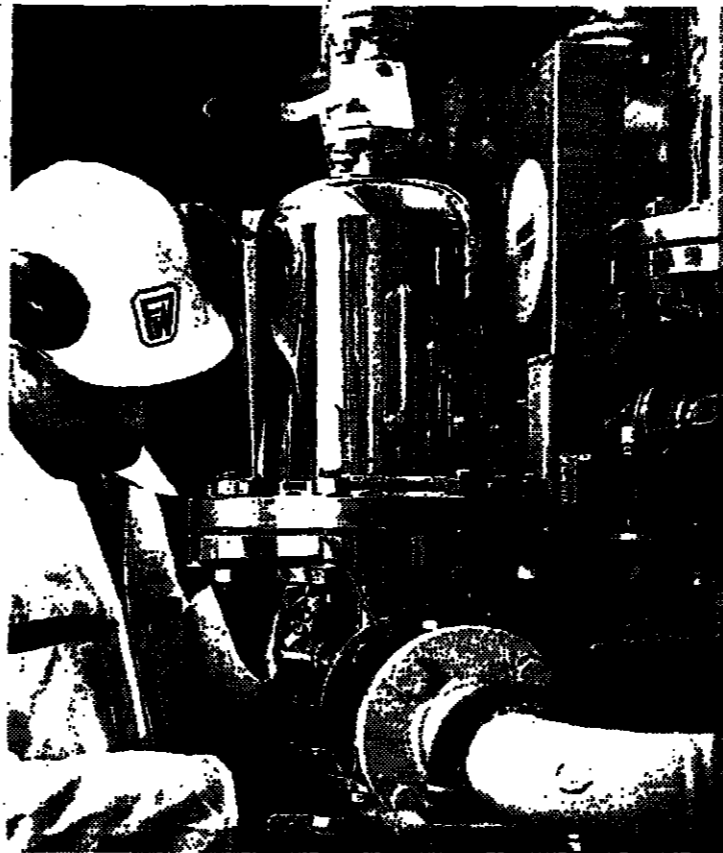
Even so, the increasingly competitive environment in the chemicals industry is encouraging large companies to develop more open, long-term relationships with the contractors to avoid wasting energy in areas where others specialise.

Bryan Smith, ICI's director of engineering, sees the arrangements as dovetailing the respective and different skills of client and contractor - with ICI Engineering concentrating on technology development and "front-end definition work," and the two contractors carrying out the execution of projects.

"ICI Engineering provides an engineering service to about 20 distinct business entities," he says, "and in many cases engineering has the potential to transform the business. Our need is to transform the way we look at our task, adding value rather than looking at the mechanics of the project."

Consequently, the new approach is producing cultural change at ICI, and that, says Smith, is probably more important than the direct benefits of a non-adversarial method for handling contracts. "A collaborative approach has been proven to work better," he says. "It's common sense that it should do, so long as you do not get too cosy or sloppy."

At first glance, it is the "cosiness" or otherwise of technology partnerships that raises eyebrows. Aren't



Foster Wheeler: at the centre of the technology partnership trend

the clients and contractors getting a little too close for comfort?

Not so, say the three companies involved. ICI ran the equivalent of a year-long beauty contest on about 19 contractors - an exercise which Chatman had not seen in 40 years in the industry. The 19 were asked what technologies they had covered. "With our wide range, there were precious few that covered half the spectrum," says Smith.

This reduced the list to seven contractors, each of which was interviewed by a team of ICI project managers for a day to a day and a half. That only reduced the list to six, but then ICI really went to town - sending in functional specialists to assess the contractors in 19 different categories, and using a marking grid for the results.

ICI had originally intended to have three preferred contractors, but with recession looming it decided it would be unfair to include a third company which matched its needs less well, as it would not get any work.

The two winners were announced last year, leaving a handful of very disappointed contractors. "In at least one case they were devastated," says Smith. "But when they realised the process had been done objectively, it took some of the pain away. And most said it was the best feedback they'd ever had."

In a sense, the technology partnership process mirrors the trend in manufacturing industry towards a reduced number of suppliers. Without mutual trust and understanding, normally built up over years of contact between client and contractor, the system will not work.

The arrangement also helps the client manage computer-based design and procurement data in a way which is very difficult when projects are being handled by many different contractors. ICI and the two contractors are working jointly on linking the three computer systems into a common network - although John Brown and Foster Wheeler will not share information.

But the checks and balances of a client-contractor relationship still remain. The ICI teams that carried out the original tests can check whether the contractors can really do what they claimed, and the agreements are not absolutely exclusive.

Ultimately, ICI could even terminate the agreement, but that would be a "devastating" indictment of the contractor's reputation, says Smith. "We have every confidence in the contractors, and they've got a lot of trust in us," he adds.

ICI is carrying out independent benchmarking to assess the benefits of the deal, but precedents in the US, which were the subject of a study three years ago, suggest savings of 5 per cent on overall project costs and an average 5 per cent reduction in project schedules.

Eliminating the tendering process for each project could save two to three months, says Ian Robinson, chief executive of John Brown's engineering and construction business, but the client could spend that time thinking further about the project to ensure it is making the right investment decisions.

Overall costs should also be reduced, particularly when contractors are working for the second or third time on a similar project. "I am quite convinced we will be able to tackle successfully the issue of reducing the total installed cost of the plant," says Robinson.

Technology partnership deals bring the contractor a solid "base-load" of work - at Foster Wheeler the agreement with ICI already generates 10-15 per cent of its business, says Chatman. The profits are not necessarily as high as on a large, tendered contract, but in an uncertain market the partnership arrangement has a stabilising effect on the contractor's workforce.

Both John Brown and Foster Wheeler have already won three or four big contracts from the partnership deals, and more are in the pipeline, says Smith. But relations have also been transformed on ongoing contracts. "We now have joint teams on most projects, and you can't tell who's who," says Smith.

## New TV for the masses

What is it going to take to turn long-promised multimedia technologies into mass market products and new sources of profit for the ailing computer and consumer electronics industries?

The latest move to unlock demand for multimedia comes from a group of companies that have formed a joint venture called First Cities with the goal of bringing interactive multimedia services to homes and schools throughout the US.

The group is led by Microelectronics and Computer Technology, a computer-industry consortium based in Austin, Texas. Members include Apple Computer, Eastman Kodak, Corning, North American Philips and two regional telephone companies.

First Cities demonstrates the converging interests of consumer electronics, computer, communications and entertainment industries that could ultimately lead to the formation of a trillion-dollar industry, according to John Sculley, Apple chairman and chief executive.

Initially the group will study the potential markets for multimedia services. Starting late next year, it aims to set up a demonstration of interactive multimedia and by early 1995 to create an interactive multimedia service available throughout the US. These might include "movies on demand" and access to information services via TV.

Interactive TV is seen by many as the most promising application of multimedia technology in the consumer sector and it is being pursued in various forms by companies including Hewlett-Packard and IBM as well as the First Cities group. To date, however, television information services have not been successful in the US and it is hard to know whether adding better-quality sound and pictures will change the trend.

"The big problem is that it is difficult to describe and explain the benefits of multipurpose multimedia systems," says Andrew Webber, a consultant with Arthur D Little.

Louise Kehoe

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## FT SURVEYS

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October 15 1992  
Financial Times  
Last month

3 TURNOVER  
currencies (\$bn)

Aug 1992	Sep 1992
41.56	42.76
54.42	54.26
11.76	11.76
6.79	6.79
11.41	11.41
11.41	11.41
11.41	11.41
11.41	11.41
11.41	11.41
11.41	11.41

STOCKHOLM was the scene of a dramatic battle for control of the Swedish telecommunications market. The state-owned company, Televerket, was forced to open the market to private competition. This was a major step towards privatisation.

meeting  
STOCKHOLM was the scene of a dramatic battle for control of the Swedish telecommunications market. The state-owned company, Televerket, was forced to open the market to private competition. This was a major step towards privatisation.

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FINANCIAL TIMES SURVEY

# INTERNATIONAL TELECOMMUNICATIONS

SECTION III

Thursday October 15 1992

**T**HE world telecommunications industry is in the midst of a radical restructuring, driven by the need to survive in a newly dynamic and competitive global marketplace – and to exploit fast-changing technologies which can give customers a competitive edge.

Already many of the old boundaries and regulations in the \$300bn-a-year worldwide telecommunications service sector have crumbled, and others are under attack.

Historically, the highly protected national post and telecommunications organisations (PTOs) which controlled domestic and international telecommunications had little incentive to improve efficiency, introduce new services or cut charges.

Generally they faced little, if any, competition and were able to develop their business at a leisurely pace, often with little apparent regard for customer needs. Because their foreign counterparts also enjoyed monopoly status, there was little opportunity to expand overseas.

But beginning in the early 1980s this cosy relationship began to be rocked by three powerful and inter-related forces – privatisation, liberalisation and globalisation. In the wake of the court-appointed break-up of the Bell system in the US and other countries, led by the UK in Europe and Japan in the Far East, began adopting policies designed to foster competition.

Since then, the PTOs in many nations have been split into separate post and telecommunications administrations, with the telecommunications business sold to the private sector.

This process continues to gather pace: according to Booz-Allen Hamilton, the management consultants, between 1991 and 1993, telecom companies in a further 26 countries, responsible for 95m lines, are expected to be privatised. In Europe, Deutsche Bundespost Telekom, Germany's state-owned telecommunications group, plans to raise DM200bn from a privatisation sale on

international markets. However, Mr Helmut Rieke, chief executive, said last month that the flotation would not be possible before 1996 at the earliest and less than 50 per cent of the company would be sold.

With their monopoly rights abolished, or at least curtailed, many of these newly-privatised telecommunications groups have begun to follow their multinational business customers and expand globally through acquisition, strategic alliances, or as stake-holders in consortia bidding for new operating licences.

British Telecom is among those with ambitious international plans. The UK carrier is planning to invest about \$500m

over the next 10 years to build an overseas network infrastructure to support its ambition to become the world's leading telecommunications group. The investment project, code-named Cyclone, will start with the installation next year of four large computerised exchanges in New York, Frankfurt, London and Sydney, followed by a further 28 switching centres in main business centres worldwide.

In addition, BT has set up Syncordia, a US-based subsidiary designed to provide sophisticated telecommunications services to multinationals. Syncordia, based in Atlanta, Georgia, was originally intended to be a strategic

partnership between BT and its German and Japanese counterparts, Deutsche Telekom and Nippon Telegraph and Telephone.

But the effort to expand Syncordia's membership did not work out as intended and while there is continuing speculation about possible new partners, Deutsche Telekom has broken away and formed a rival enterprise called EUNET-com with France Telecom.

**N**EVERTHELESS, these and other moves underline the revolution in the structure of the industry that is taking place against the backdrop of a market that continues to expand at

10-15 per cent a year. International telephone traffic grew by 13 per cent last year to about 35bn minutes and has increased six-fold over the past decade, according to the London-based International Institute of Communications.

Across the range of international telecommunications services, the traditional order is being challenged by a new generation of telecommunications service providers – including some that own no physical hardware at all.

Mr Gregory Staple, a Washington-based communications lawyer and editor of the International Institute of Communications' recently published study of the global communica-

tions market,\* argues that the business of providing international telecom services is going through a "paradigm shift."

Most international telecommunications services are still provided by national carriers which inter-connect their "half-circuits" to provide end-to-end communications channels. These facility-based or "heavy carriers" jointly own the international cable and satellite systems which make up the backbone of the global network.

Over the past decade, technology and competition have begun to challenge this model – advances in micro-electronics, fibre optics and network software on the one hand, and

progressive market liberalisation on the other, "have brought forward a new paradigm for end-to-end global services," says Mr Staple.

The new model is being pioneered by a novel type of "light carrier" which provides international service by re-selling, re-routing, re-packaging or re-programming the offerings of the heavy carriers.

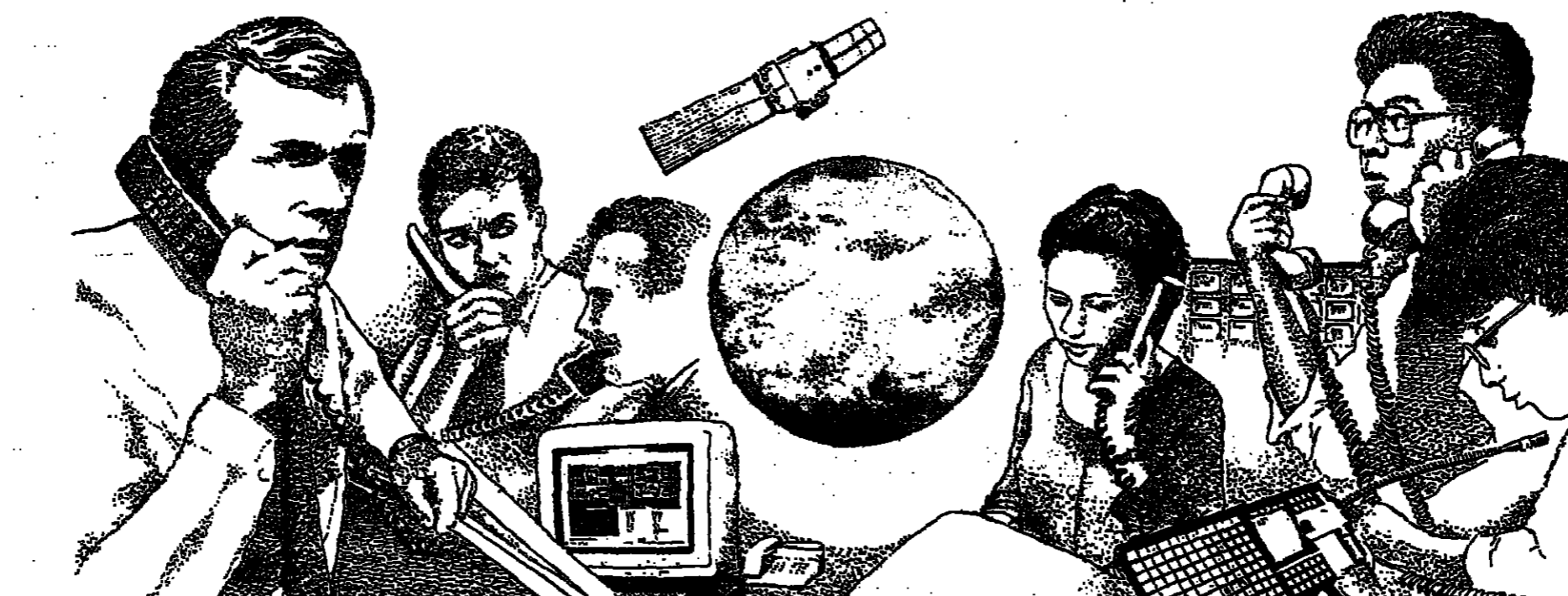
"Primarily software-based, the 'light carrier' is a telephone company in name only. It is driven by services and applications not facilities, and it may not own a single transmission cable or satellite circuit," he says.

The largest of this new generation of "light carriers" are

IN THIS SURVEY

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Editorial production:  
Michael Wiltshire



## Radical changes in the global marketplace

With rapid advances in technology and intense competition among the world's telecommunication service suppliers, customers in many countries are beginning to enjoy the benefits of lower prices and improved standards of service – but there is still a long way to go, reports Paul Taylor

companies like Electronic Data Systems (EDS), Computer Sciences Corporation (CSC) and General Electric Information Services company (GEIS) which already manage the cross-border private line and data-processing requirements of leading multinationals and have annual revenues of several billion dollars. Liberalisation is one of the main factors fostering the growth of these services and lower international call prices. For example, last month the UK government joined a handful of others in sanctioning a new form of competition called "simple re-sale" on routes from the UK to Australia, Canada and Sweden.

Simple re-sale will allow operators to lease international circuits in bulk from British Telecommunications and Mercury Communications and resell services. Customers will be able to access the resellers services via the public telephone network – which has

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## INTERNATIONAL TELECOMMUNICATIONS 2

## TELECOM VENTURES: DEVELOPMENT FUNDING

## A fresh approach

**T**HIS AUTUMN in the US, a new group of telecommunications specialists starts work at the International Finance Corporation (IFC) in Washington. Their brief is to provide funding for new telecommunication ventures around the world, and signals a new approach to investing in infrastructure by the World Bank Group.

The IFC is the arm of the World Bank which looks after funding for commercially-oriented entrepreneurial ventures. It complements the World Bank's wider role in assisting governments with public infrastructure projects.

Traditionally, the IFC has only funded relatively small telecommunications projects such as regional paging networks. The long-term and more costly infrastructure installations remained strictly within the domain of the World Bank, which provided substantial loans to governments.

Now that many governments are looking to the private sector to build and run infrastructure projects, it seemed appropriate for the IFC to take a wider role in telecoms. The IFC has been given a boost to its

funding and has a remit to provide finance for very large projects, although the World Bank will also continue with its interest in the sector.

Typically, new projects today are financed using a combination of loans from several sources. Money from the World Bank, IFC or other aid body, could be put together with direct investment by a foreign telephone company, as well as funding contributed by the government or network operator itself.

## Organising funding for new projects can be fraught with problems

Eastern European countries can also apply to the European Investment Bank or the European Bank for Reconstruction and Development (EBRD).

For example, Bulgaria is getting \$150m for an overlay network to connect the main towns and cities. More than half is coming from the European Investment Bank, and from funding generated by the Bulgarian phone company itself. The rest will be provided

by the EBRD and the World Bank. Telecommunications networks are considered an attractive investment opportunity, because they can generate large profits once the network has been installed.

Yet organising funding for new projects can be fraught with problems. A big factor in a decision to invest in telecoms is the political stability in the country which is looking to install the network. This is because the government retains the right to regulate tariffs, radio spectrum, way-leaves, and many other issues which affect the phone company's ability to carry out its business. In a shaky political environment, investors tend to run shy.

Most of the interest among the lending bodies at the moment is turning towards eastern Europe and the Commonwealth of Independent States (CIS). But interest is

also reviving in some Latin American countries, such as Chile and Mexico, where the political environment is becoming more friendly to outside investors. However, each of the lending organisations operates differently. World Bank loans are agreed between the bank and the government of a country. Of the total sum lent, a portion may be for telecommunications. Loans are normally for 20 years, with a five-year grace period.

The IFC acts more like a commercial bank. It could, for example, choose to take an equity stake in a venture, instead of just lending the money. According to Tim Nulte, a principal economist at the IFC, it will look for projects that offer a good commercial return, but it will act with a social conscience. This means that rural networks will not be neglected in favour of those serving business or large met-

ropolitan markets where the profits are more obvious - "under the right conditions, independent phone companies can be a very good business," he says.

Some eastern European countries are keen on the idea of having lots of small phone companies, which they believe could get phones into people's homes and offices more quickly than the incumbent monopoly phone company. The IFC could look favourably at this concept, based on the success of smaller phone companies in the US.

Telephone companies invest directly in new networks by taking an equity stake. They also take a proportionate share of the profits. They therefore look for the projects which have the greatest commercial viability.

However, the phone companies also have to carry some of the risk in local currencies:

they have to accept payment from subscribers in roubles, zlotys or forints, and re-invest the money locally. Some lending agencies have been criticised for only taking repayments in hard currency. But they have to borrow the money on the world financial markets in order to make the loan in the first place. They have to get hard currency in order to meet their own commitments.

All investors in new telecommunications networks put forward certain prerequisites before they will hand over any money. Nick Williams, a partner at Touche Ross management consultants, says that most lending agencies want to ensure that the regulatory environment is favourable to generating profits. They insist that the government restructures the telecommunications sector. The first step is usually to hire a foreign management consultancy to assess how best

to do this. The money to pay for consultancy studies is often obtained as a direct grant from individual government's overseas aid funds.

According to Nick Williams, there is a widely-held view that a strong, monopoly phone company that has the opportunity to get going on a firm footing, with perhaps the prospect of competition at a later stage.

Telecommunications networks can start earning revenue quite early in their life: as soon as a new exchange is in

## In a shaky political environment, investors tend to run shy

place, it can start putting through calls. The income from the first stage is normally ploughed back into the business, to build up the network.

Typically, the 30-40 per cent of the infrastructure cost which is self-funding, and that has to come from revenue generated. There is a fear that if competitive networks, along the lines of the British or US model, were introduced, it could damage the chances for

these brand new networks to develop profitably.

Lending agencies also like to see that steps are in place to turn the phone company from what was an unresponsive state-run organisation into a commercially sharp one. There is a need to learn financial and commercial skills which they have not previously needed. These include double entry accounting, cost centres and marketing.

A particular concern in this sense is tariffs. In much of eastern Europe, call-charges are still priced the same way they were under the old communist regimes. Mr Williams explains that most tariffs are too low to generate the revenue needed to meet the loan repayments, yet to raise charges is politically unacceptable. In some cases, tariffs should be raised by 200 per cent. For example, in Czechoslovakia, the government decided recently not to increase it. Yet a new digital overlay network will require \$1.5bn in funding, and the call charges are around 2p for an untime local call.

Monica Horten

## Total deregulation is still a long way off

## Resistance in Europe

**B**RUSSELS is well aware that the development of Europe's telecommunications infrastructure is essential to obtain maximum benefit from the single market and to strengthening the EC's global competitive edge. It is estimated that more than half of EC jobs depend on information and communication technology. Telecommunications alone are set to account for around 6 per cent of the EC's GDP by the year 2000.

The Commission estimates full liberalisation of the EC's telecom market would double its rate of growth, and increase by four the size of the market over the next 20 years.

But despite several years of market reforms and a plethora of EC directives and recommendations which have succeeded in opening up the terminal equipment market and a substantial part of telecommunications infrastructure, the vast majority of EC telephone services is still under the control of state-owned monopolies.

The Commission strategy to crack open the crucial voice telephony market, which account for 90 per cent telephone services is centring around just a small section of that market: cross-border

phone calls. And like previous deregulatory moves, the Commission's aspirations look set to face resistance from EC member-states every step of the way.

Paris' successful stab at persuading the Commission from even discussing the plans until after the French referendum on Maastricht clearly illustrated political sensitivities in the sector. The French government feared that an attack on France Telecom would have been the last straw for many undecided voters.

The cornerstone of EC telecommunications policy is the

## Most of the EC's phone services are still under the control of state-owned monopolies

much-read 1987 Green paper. The document emphasised opening up the terminal equipment - telephones, faxes, modems and the like - to free competition and the partial liberalisation of the telecommunications services business.

In 1988, the Commission issued a directive to open up the EC's market for terminal equipment to competition. The

aim was to allow consumers to benefit from new technology and design by giving them a free selection instead of the 'Hobson's choice' offered by many of Europe's telephone monopolies.

In order to do so, the Commission took advantage of its mandate under Article 90 of EC competition law: this allowed the commission to bypass the EC's Council of Ministers and the European Parliament to pass legislation to stop member-states maintaining measures contrary to the Treaty of Rome rules on the free market.

But there was one institution which the commission still had to reckon with: the EC's constitutional watchdog, the European Court of Justice. France, backed by a number of other EC countries, challenged the Commission's right to the use of Article 90.

Their main concern was that they would be left out of future discussions on the abolition of their national telephone

monopolies. Three years later, the court ruled the commission was acting legitimately in relation to state measures affecting telecommunications undertakings where these measures were at odds with the treaty. But a looming court decision slowed down liberalisation as private sector investors were hesitant to take up the new opportunities until the political situation was more certain.

The Commission faced similar contention from mainly the southern EC states when it focused its attentions on pricing open the ten per cent or so of the services market that was not voice telephony.

A deal was reached at the end of 1989 between the Commission and EC governments for a strategy to introduce competition for what is known as value-added services, including electronic mail and data bases and the resale of data communication services from January next year.

The commission was allowed

to consider prolonging the resale of capacity of leased lines for those member-states whose network for packet switched data transmission services was not yet sufficiently developed.

Member-states were also allowed to impose obligations on private service providers in the field of basic packet or circuit switched data transmission, if the activities of the private operator jeopardised the delivery of basic services.

Even so, the package was quickly challenged in the Court of Justice by France, Belgium, Italy and Spain. The judgment is not due until the end of the year.

Liberalisation of the EC's telecommunications market is not possible without giving private operators access to the vast telecoms infrastructure.

The basic principles of the open network framework directive, adopted in 1990, is the harmonisation of the technical characteristics of the EC's tele-

phone networks, the conditions of their usage and tariff principles.

The most important piece of legislation in the ONF framework adopted to date is a directive laying down the conditions for leased telephone lines.

Two other proposals aimed at encouraging competition and beefing-up the quality of phone services and which will be significant for users were adopted by the Commission in July.

The first proposal would introduce a common EC-wide licensing system for all providers of phone services. Once implemented, this will mean that companies approved to offer certain voice services in one EC country would automatically obtain the right to do business EC-wide.

The second piece of legislation, the directive on open network provision for voice telephony, at the same time laid down basic guarantees for ordi-

nary residential telephone service users but which also obliged government-run telephone companies to provide crucial inter-connection services for outside operators.

The directive also set minimum quality standards to be provided by member-states on services such as the length of time to install a new telephone and minimum compensation rules if the services are not provided.

Opposition from France and other EC governments to Commission plans to open up to competition - even a fraction - of voice telephony services,

## The deregulation of voice telephony in the European Community is proving elusive

stems from the belief that only by maintaining large monopolies will Europe be able to fight off Japanese and American infiltration of the market.

"We are not against liberalisation, but we feel the aim should be the creation of a European telecommunications network," said Bruno Janet, spokesman for France Telecom, pointing to the creation

last September of a European network for data transmissions between several of the EC's telephone monopolies.

His company points to the relative health of the EC's telecommunications sector where profits increased from Ecu 91m in 1978 to Ecu 383m in 1991, as proof that there is no need to hurry in deregulation.

Even under British Telecom's own reckoning, French telephone tariffs are the lowest in Europe.

France is also arguing that unless a strategy for the liberalisation of the whole of the voice telephony sector is worked out, it will be private telephone subscribers - who lack the vociferous lobbies of business users - who lose out.

Europe's telephone companies tend to finance less profitable services with the money-spinning international calls sector. They are calling for more time and "greater reflection."

What is certain is that however much the EC's Competition Commissioner, Sir Leon Brittan, would like otherwise, total deregulation of voice telephony in the EC is still a long way off.

Hilary Clarke

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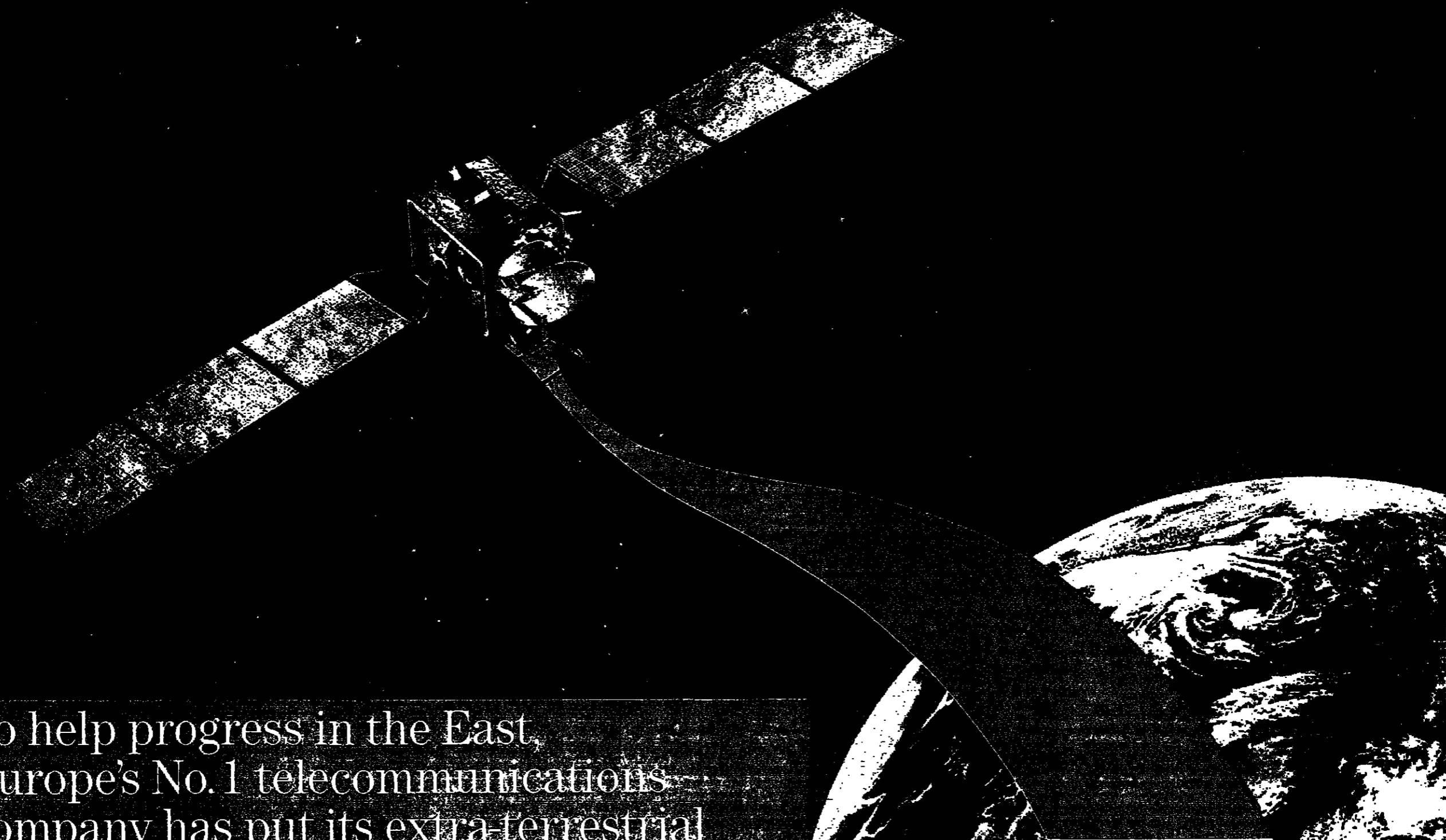
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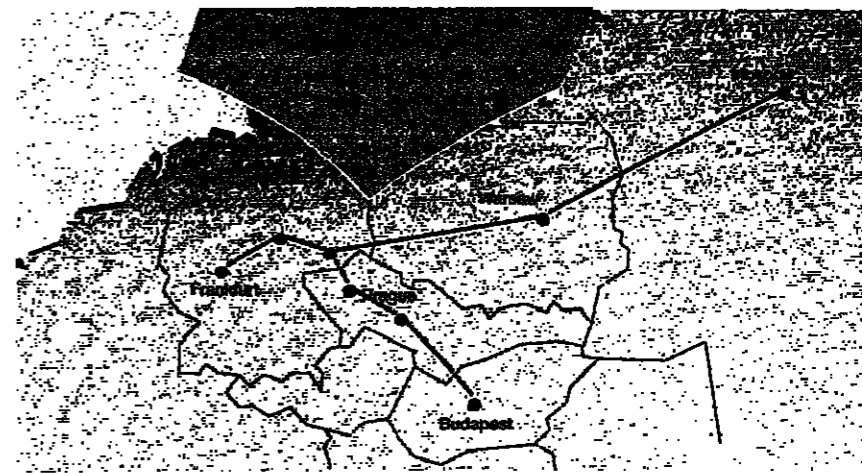
can be to a country's economy has been amply demonstrated in the former GDR.

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ROMANTIS project to help the CIS develop a satellite-supported communications network to connect its member countries both to each other and to the West's telephone network. From 1995, a total of 3 million lines should be in place. But Telekom involvement goes further. With the TEL (Trans-Europe Line) project, we are planning a fibre optics cable that goes from Frankfurt via Prague to Warsaw, Budapest, Moscow and the Baltic States. Those are just two examples of how Telekom is helping Eastern Europe to gain access to the industrialised nations of the West: all in the interest of economic recovery and improved relations. So if you have challenging communications problems to solve, talk to Europe's largest telecommunications company - Telekom.

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## INTERNATIONAL TELECOMMUNICATIONS 10

## SATELLITE EARTH STATIONS

## New window of opportunity

**A**SKED what was the most important factor affecting their investment decisions in eastern Germany, most German businessmen in a newspaper poll this summer said it was the availability of good telecommunications links.

A follow-up question might have been along the lines of "how easy is it to get hold of good telecommunications links in the region?"

The answers would have ranged from "not very easy" to "almost impossible."

It is not that Deutsche Telekom has neglected its responsibilities. The state-owned German company is investing massively in the old GDR. By 1997, it will have ploughed DM70bn into the modernisation of the east German network in just seven years. And, by the turn of the century, telecommunications links will be equally good in east and west Germany.

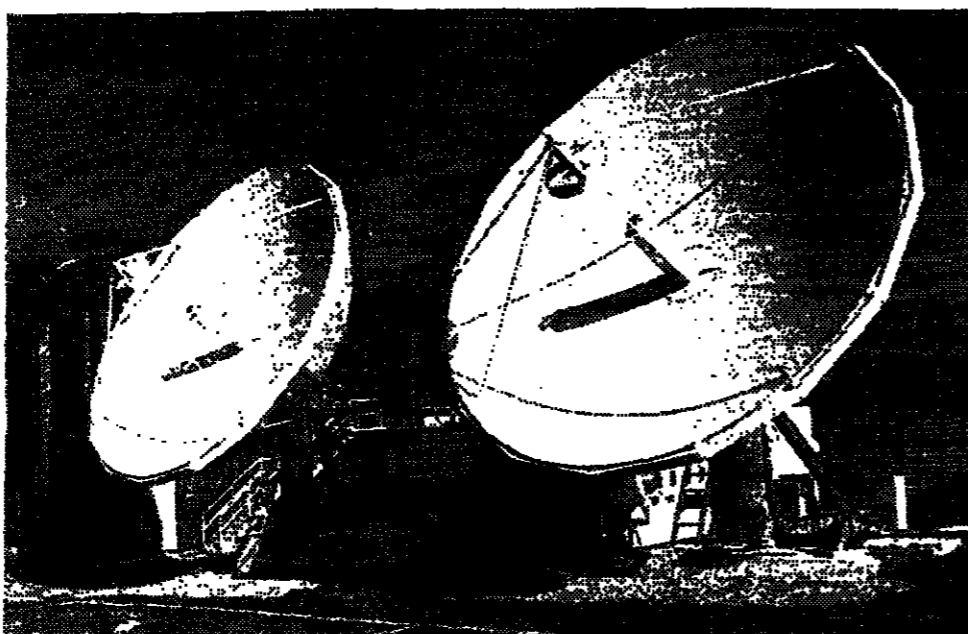
But for German businesses who have had to cope with an overloaded, antiquated telephone service since unification in 1990, the promise of better telecommunications in the future offers little comfort. It is their short-term needs that have given companies like the Hanover-based Teleport Europe the opportunity to sell business communications services using a satellite technology which has been popular in

**There is high potential for "vsats" (very small aperture terminals) in eastern Europe**

the United States for some time but has failed to make an impact in the UK.

The technology is based on small satellite earth stations called "vsats" (very small aperture terminals). A typical user of vsats would have anything from 10 to 600 earth stations - one serving each part of the network - and each one connected via a central hub or off-ice.

Information can then be passed from one vsat to another by bouncing signals off a geo-stationary satellite



Transmitting TV and radio services: NTL's (National Telecommunications) earth station at Chilworth, near Southampton, is still used by BSkyB for the Marco Polo satellites. With 600 transmission sites in the UK, NTL, based at Winchester, Hampshire, is now marketing its fast-response maintenance infrastructure to the mobile radio sector

located some 22,500 metres above the Earth's equator.

Vsats provide an alternative to data communications networks based on packet switching technology. These are known as X.25 networks, and have been rolled out over much of western Europe. They are currently cheaper and of higher quality than vsat networks. Vsats are also used for video, and while voice communications are possible, there are a number of technical difficulties.

The opening of eastern Europe, where it will take years to build up the telephone networks to the standards of western Europe has provided a window of opportunity for vsats. A vsat network is a stand-alone system, so it does not rely on the existence of a modern telecommunications infrastructure. It can also be installed in days, whereas a dedicated terrestrial X.25 pan-European network can take months to deliver.

Vsats are ideal, therefore, in eastern Europe where fixed telecommunications infrastructures were falling apart at the end of the 1980s, following years of neglect during Com-

munist. A role for vsats was recognised by the German government shortly after reunification, and in 1990, it started awarding licences to private companies to offer vsat services to businesses in eastern and western Germany. Vsat service providers were allowed to offer voice as well as data services - the first time that Deutsche Telekom monopoly in the provision of basic voice services had been broken. In all, 26 licences have been awarded in Germany since 1990.

A report by the UK consultants CIT Research, published in July, forecasts that by the year 2001 eastern Europe will account for 51 per cent of installed vsats for two-way business communications services. But vsats are also beginning to find a market in western Europe among multinationals which need networks up and running quicker than would be possible with a dedicated X.25 system.

Holiday Inn, the US hotel group, is having a vsat network for its European hotels installed by MCI, the US long-distance telephone operator.

The German car giant Daimler Benz has its 20 European subsidiaries linked with a vsat network supplied by Deutsche Telekom, while Renault in France is to set up a vsat network connecting its dealers across Europe.

The network, which is being supplied by Teleport Europe, will be used for data and business television. Renault considers that vsats could be less expensive and more reliable in the long run than terrestrial X.25. Volkswagen and Ford are monitoring the success of the Renault system.

Large users in Europe often complain about the high price of vsat systems. But Jon Collins, the managing director of the European office of AT&T Tridom, the US vsat manufacturer, says that "because the majority of the cost is in the central office, its cost is diluted across the network."

For companies like Renault, therefore, which has thousands of dealers in Europe, vsats could work out cheaper than X.25.

Installing a vsat network in every European country can, however, be difficult. Austria, Belgium, Ireland, Italy, Nor-

way, Portugal, Spain and Switzerland do not give licences to companies like Teleport Europe to provide business services by satellite. If a company wanted a vsat network in one of these countries, it would have to go to the PTT - if that is, the PTT is prepared to sell it a vsat network rather than an X.25 terrestrial network.

The regulatory environment is, however, changing and Collins reckons that at the start of next year, Spain, Italy and Greece will move towards deregulation.

Meanwhile, Teleport Europe is managing to supply its customers in France and Germany with Europe-wide vsat networks by negotiating with the PTTs or regulatory authorities in different countries and in some cases, working with the PTT.

Regulatory constraints have been one of the main reasons behind the slow growth in satellite business services in Europe. Jon Chaplin, a telecommunications expert at the European Space Agency, estimates that the satellite share of the Ecu 85bn European telecommunications services market is only 0.5 per cent (\$440m). In the United States, satellites account for two per cent of total telecommunications revenue.

But CIT Research estimate that by the year 2001, total rev-

**Satellite technology is more popular with businesses in the US than in Europe**

enues for satellite business services in Europe will have increased from Ecu 270m in 1991 to Ecu 1bn. CIT is also forecasting that in 10 years time, there will be 130,000 vsat terminals in Europe.

Today, it is estimated that there are between 65 and 75 vsat networks in Europe comprising roughly 2,500 individual two-way terminals.

**Mark Newman**

The writer is co-editor of the Financial Times newsletter, "Telecom Markets."

## A changing marketplace

Continued from page one:

not been permitted under the more restricted form of resale allowed since last year.

Government motives behind moves towards privatisation and liberalisation have been mixed. In the UK, the driving force was the political conviction that private ownership would be more efficient than public ownership. But elsewhere other factors have been more important. In some developing nations, including those in eastern Europe, the prime motive has been a recognition that central government lacked the funds to modernise and extend the inadequate networks.

However, privatisation and liberalisation have almost always gone hand-in-glove because although many governments were prepared to tolerate state-run monopolies, they have been much less willing to sanction private sector monopolies.

Even those governments, such as Germany and France which have retained a large element of state ownership in the telecommunications sector, have also found it desirable to introduce competition, for example in the provision of cellular mobile services.

But liberalisation has not necessarily meant deregulation. Indeed, to ensure fair play for new entrants in liberalised markets many governments have actually established tougher regulatory regimes. Most governments have also stopped short of totally abolishing monopoly rights and have not necessarily moved in step with each other.

In Europe, the European Commission has so far only required competition in terminal equipment and data services and not in basic voice telephony, although some governments - like the UK - have moved considerably further down the liberalisation path.

After much discussion and delay, the Commission has still to unveil the next stage of its programme to open up the \$110bn European telecommunications sector to full and harmonised competition. While the aim is to create a market with lower prices, a wider variety of services and more intensive use of telecommunica-

tions, the French government in particular continues to oppose further rapid liberalisation in Europe.

Nevertheless, the Commission can claim credit for pushing ahead with the Groupe Special Mobile (GSM) communications digital standard which, according to Dr Peter Radley, director of Alcatel's mobile communications division, "has been a great European marketing success," and, despite its complexity, has helped give European equipment manufacturers a key advantage over their international competitors.

Indeed, European equipment manufacturers have emerged well-placed from the wave of consolidation which has already swept through the telecommunications equipment sector to produce just a handful of really big players.

According to Dataquest fig-

**At least 60 per cent of the world's 580m phone subscribers still pay relatively high prices for international calls**

ures, the league table is now led by Alcatel of France with \$15.53bn of revenues in 1991; followed by Siemens of Germany, including its UK-based GPT 4060 joint venture with Britain's GEC; AT&T of the US; Canada's Northern Telecom; NEC from Japan; Sweden's Ericsson; and Motorola of the US.

"The ranking clearly shows the continued concentration of the telecoms equipment industry in the hands of a declining number of suppliers," says Dataquest. "Global companies continue to grow by acquisition and alliances as they are forced to expand internationally... national companies are finding it increasingly difficult to fund the R&D necessary to survive alone."

This international R&D effort has already delivered technologies such as fibre optics which are changing the face of telecommunications. Other new, and often software-driven, technologies like digital cellular mobile telephony, low earth orbit satellite systems and desktop video conferencing are now emerging from the research laboratories. And although integrated ser-

vices digital network (ISDN) services have been slower to take-off than many predicted, there is little doubt that in the longer term voice and data communications and data processing systems are converging.

Advances in technology are enabling the network operators to assemble more flexible, customised and value-added communications services like electronic mail, enhanced fax and on-line computer services often aimed directly at business users.

For example, one of the latest acronyms to emerge from an industry which generates more buzzwords than most is the "VPN" or virtual private network which enables business customers to use the public network as if it were a private network, with all the advantages of cost savings, maintenance and support.

In developing countries, including eastern Europe, cellular mobile systems are helping provide an alternative to unreliable and over-stretched fixed wire systems while in the West new lightweight low-cost digital Personal Communications Network services could finally provide a real market alternative to the hard-wired telephone.

The main beneficiaries from this new era of liberalised telecommunications services are likely to be the industry's customers who have been demanding more application-specific system solutions to gain or maintain a competitive edge in their own industrial sectors.

These customers stand to gain from access to a much wider range of more competitively-priced and higher quality products and services delivered by the survivors of the current maelstrom.

Already, customers in many countries are beginning to enjoy the benefits of lower prices and better standards of service, for mobile as well as fixed services. But there is still a long way to go. Mr Staple estimates that at least 60 per cent of the world's 580m telephone subscribers still pay relatively high prices for making international calls simply because of where they happen to live.

\* TeleGeography, 1992; published by the International Institute of Communications.

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### Fixed Income (US & European products)

- Trading Assistant Ref TA/FT
- Financial Control Ref FC/FT
- Operations Ref OP/FT

### Financial Control

PaineWebber's product range includes Commodities, Equities, Foreign Exchange, Stock Lending and Structured Products. The UK group invites candidates (preferably ACAs) with financial control experience of this environment as follows:

- Senior Controllers - minimum 5 years' experience Ref SC/FT
- Junior Controllers - minimum 2 years' experience Ref JC/FT

Please write enclosing CV, quoting reference shown, to  
Larry Forrest, Director,  
PaineWebber International (UK) Ltd,  
1 Finsbury Avenue, London EC2M 2PA.

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OCTOBER 16 1992  
Tel: 071 925 2122

# FT MANAGED FUNDS SERVICE

Current Unit Trust prices are available from FT Cityline. For further details call (071) 925 2122.

OTHER UK UNIT TRUSTS									
Unit Trust Name	Manager	Investment Objective	Units	Price	Yield	Assets	Assets	Assets	Assets
Standard Life Unit Trusts Ltd (120001)									
Standard Life UK Bond	Standard Life	UK Government & Corporate Bonds	100	1.25	4.5%	£100m	£100m	£100m	£100m
Standard Life UK Equity	Standard Life	UK Shares	100	1.15	12.5%	£100m	£100m	£100m	£100m
Fidelity Investments Ltd (120002)									
Fidelity UK Bond	Fidelity	UK Government & Corporate Bonds	100	1.20	4.5%	£100m	£100m	£100m	£100m
Fidelity UK Equity	Fidelity	UK Shares	100	1.10	12.5%	£100m	£100m	£100m	£100m
Investment Management Ltd (120003)									
Investment Management UK Bond	Investment Management	UK Government & Corporate Bonds	100	1.22	4.5%	£100m	£100m	£100m	£100m
Investment Management UK Equity	Investment Management	UK Shares	100	1.12	12.5%	£100m	£100m	£100m	£100m
M & G Securities Ltd (120004)									
M & G UK Bond	M & G	UK Government & Corporate Bonds	100	1.23	4.5%	£100m	£100m	£100m	£100m
M & G UK Equity	M & G	UK Shares	100	1.13	12.5%	£100m	£100m	£100m	£100m
Sun Life of Canada Unit Trusts Ltd (120005)									
Sun Life UK Bond	Sun Life	UK Government & Corporate Bonds	100	1.24	4.5%	£100m	£100m	£100m	£100m
Sun Life UK Equity	Sun Life	UK Shares	100	1.14	12.5%	£100m	£100m	£100m	£100m
Swire Life Unit Trusts Ltd (120006)									
Swire Life UK Bond	Swire Life	UK Government & Corporate Bonds	100	1.25	4.5%	£100m	£100m	£100m	£100m
Swire Life UK Equity	Swire Life	UK Shares	100	1.15	12.5%	£100m	£100m	£100m	£100m
T. U. Fund Managers Ltd (120007)									
T. U. UK Bond	T. U. Fund Managers	UK Government & Corporate Bonds	100	1.26	4.5%	£100m	£100m	£100m	£100m
T. U. UK Equity	T. U. Fund Managers	UK Shares	100	1.16	12.5%	£100m	£100m	£100m	£100m
Target Trust Managers Ltd (120008)									
Target Trust UK Bond	Target Trust	UK Government & Corporate Bonds	100	1.27	4.5%	£100m	£100m	£100m	£100m
Target Trust UK Equity	Target Trust	UK Shares	100	1.17	12.5%	£100m	£100m	£100m	£100m
Thames Valley Unit Trusts Ltd (120009)									
Thames Valley UK Bond	Thames Valley	UK Government & Corporate Bonds	100	1.28	4.5%	£100m	£100m	£100m	£100m
Thames Valley UK Equity	Thames Valley	UK Shares	100	1.18	12.5%	£100m	£100m	£100m	£100m
United Trustees Unit Trusts Ltd (120010)									
United Trustees UK Bond	United Trustees	UK Government & Corporate Bonds	100	1.29	4.5%	£100m	£100m	£100m	£100m
United Trustees UK Equity	United Trustees	UK Shares	100	1.19	12.5%	£100m	£100m	£100m	£100m
Waverley Unit Trust Managers Ltd (120011)									
Waverley Unit UK Bond	Waverley Unit	UK Government & Corporate Bonds	100	1.30	4.5%	£100m	£100m	£100m	£100m
Waverley Unit UK Equity	Waverley Unit	UK Shares	100	1.20	12.5%	£100m	£100m	£100m	£100m
Windsor Asset Management (120012)									
Windsor Asset UK Bond	Windsor Asset	UK Government & Corporate Bonds	100	1.31	4.5%	£100m	£100m	£100m	£100m
Windsor Asset UK Equity	Windsor Asset	UK Shares	100	1.21	12.5%	£100m	£100m	£100m	£100m

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